GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

PROPRIETORS: WALTER KING, LIMITED. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

Telephone: Central 6055. —— Telegrams: "GASKING, FLEET, LONDON."

VOL. CLXXXIII. No. 3406.] WEDNESDAY, AUGUST 29, 1928. [80TH YEAR.

Editorial Notes.

The Rating Rebuff.

THE Chancellor, having spoken for three hours and a quarter in the House on April 24 last, sat down amid loud cheers; and on the following morning thinking men and women throughout the land were eagerly tracing out the broad lines of the Government's gigantic scheme of rating reform, which is to break the vicious circle of high rates and low employment, and give new life to "all those basic industries which used to be the glory of this island." Mr. Churchill did not claim to have done more in his masterly oration than outline the scheme; and he announced that the Government would welcome the help of suggestive and constructive ideas from any quarter. The main object, however, was clear—the granting of relief to productive, as distinct from purely distributive, industry, with the one exception of the public utility undertakings. But those whose energies are devoted to the national service of gas supply soon began to look forward to some measure of help, for the "public utility" part of their business is gas, and no semi-monopoly exists for them in respect of their other products. Therefore the National Gas Council formulated and advanced the claim that the rating relief to be allowed by the Act be applicable as to 25 p.ct. of the rates payable by gas undertakings; coke, tar, and chemical products having been established as responsible for that proportion of the industry's income. At each opportunity during the passage of the Bill, the claim was pressed, for representatives of all three political parties were anxious to assist the industry in obtaining justice. However, so little notice was taken of the claim that the chance of real discussion in Committee perished under the guillotine, and the Speaker ruled the question out of order on the third reading of the Bill. In the reply of the Minister of Health to the debate we find the major considerations ignored in face of the customary prejudice. The effect of a rebate on 25 p.ct. of the rateable value of the gas industry, said Mr. Neville Chamberlain, "would not be to put them on an equality with their competitors, but would be to give them an advantage which would enable them to reduce the price of gas and bring them into serious conflict with their competitors, the electricity supply companies." Whoever else may suffer, always there must be maintained the barbed-wire entanglement around the Government strongpoint. Whether it was indeed this consideration that weighed heaviest in the balance, we cannot say; but on Aug. 3 the Rating and Valuation (Apportionment) Bill received the Royal Assent, and the gas industry its final rebuff.

Some Reflections.

IN view of this, we may be allowed a few further reflections on the Budget speech. Why, for instance, was the only reference therein to our industry one of such mousetrap finality? "For long we debated whether they [the public utility undertakings] should be in or out [of the scheme], but we came to a definite conclusion that they should remain outside." We would have given much to hear that long debate, for by no stretch of the imagination could water and electricity undertakers be called anything but distributors; and so it must have been gas supply that kept Ministers long in solemn conclave, with the dark spectre before them of having to hand to gas a favour withheld from the usual recipient of loving care. What but this ominous possibility should have detained them? The principle had already been laid down; statistics were at hand; the machinery was in existence. "A clear distinction," said the Chancellor, before delivering his mousetrap judgment, "can be drawn between productive industry and the distributive trades. Productive industry is exposed in the main to world-wide competition. It cannot recoup itself from the consumer." At this moment that clear distinction is being drawn by Assessment Committees throughout the land and an army of Government valuers and officers, who are at grips with the task of threshing the wheat of production from the chaff of distribution—deciding whether this or that firm has claimed its just due, whether this or that trifle shall be "derated." Verily a gigantic undertaking; whereas in the gas industry the clear distinction was already in existence as regards the great majority of the undertakings, and a brief investigation would have sufficed to check the National Gas Council's claim for 25 p.ct. as the productive portion of the industry's activities. "Productive industry is exposed in the main to world-wide competition"—a very acceptable definition, and a potent reason why relief should have been given us. Our coke, apart from the keenest competition at home from those who now look forward to their share of the rating benefits, is susceptible to all the repercussions of the Continent; our tar is at grips with imported substitutes; and our chemical products, restricted in output and opportunity by archaic legislation, face the continuous expansion of English and international trusts. And least of all industries can that of gas supply recoup itself from the consumer. We thank you, Mr. Churchill, for so admirably circumscribing our case, though in the light of what has happened the definition reads like a rather poor pleasantry.

Now it is no use crying over spilt milk; but we can state emphatically that the gas industry is far from satisfied with the treatment it has received. We cannot find that any serious effort was made in Whitehall to challenge the fairness of the National Gas Council's proposals; and, powerful and broad-minded as it is, the industry had a right to expect at least a full and reasoned answer to its claims. The meagre crumbs of comment which were vouchsafed appear to us to be, indeed, the counterpart of the negative attitude which the Government have hitherto adopted towards the proposed gas legislation. Such treatment is apt to shake the faith even of the gas industry, which the Government may think long-suffering and resilient enough; and so we would remind them of those same legislative proposals, which have failed for two years to rivet the attention of the Government, but which the gas industry is desperately anxious to see carried into effect. If the urgency and the fairness of

these reforms were recognized, it would at least constitute a token of present goodwill and an earnest of future treatment. Once more we quote from the Budget speech: "The removal of invidious burdens constitutes no favour. "If the burdens are found to be invidious, the removal "is an act only of policy and justice."

The Gas Industry in Ireland.

The vast majority of the gas undertakings in Ireland being of small or medium size, it was only natural to suppose that the troublous economic conditions of recent times would press somewhat hardly upon the industry there. This, in fact, did happen; but in most cases those responsible for the management of the various undertakings appear to have more or less left their difficulties behind them. This speaks well for the vitality of an industry whose stability is so essential to the well-being of the community. There are, of course, pressing problems to be solved; but they are being tackled with a stout heart and a firm belief in the soundness of the proposition which gas offers. The annual meeting of the Irish Association of Gas Managers, which was held a fortnight ago in Belfast, provided evidence of resourcefulness which augurs well for the future of the industry. The proceedings, indeed, contained much to interest the large number of members present; and it would have been all to the good had the attendance been even larger. Everywhere there is urgent need of co-operation; and in Ireland this urgency is at any rate no less than it is elsewhere. Circumstances vary widely in different places; but the goal is always the same—the best service at the lowest practicable price. Works are often far apart, and these annual gatherings afford an opportunity of converse with fellow engineers which may be difficult to secure by any other means; and it really is important to know what "the other man" is doing. Suggestions thrown out at the Belfast meeting for co-operation were in relation to the marketing of coke and the disposal of tar; but there are numberless other ways also in which it can be exercised.

It is gratifying to note that the National Gas Council now represents some 99 p.ct. of the gas made in Ireland; but it is more than probable that the very small percentage which still remains outside is represented by undertakings at least as much in need of all the advantages that membership of the Council offers as are those who have already come into the fold. Percentage of output, of course, is by no means the same as percentage of undertakings. It is quite conceivable that 1 p.ct. of the output of gas in a country like Ireland may be represented by quite a respectable number of small works. The contributions which such undertakings would be called upon to make to the funds of the National Gas Council would be quite out of proportion to the benefits the undertakings would derive from membership. Why, then, should there be any hesitation in joining? Much good work for the industry in Ireland has been done by the Council during the past year—mainly in connection with the Dundalk rating appeal and the new Free State gas legislation—and much more still remains to be done. In what lies before it, let the National Gas Council speak, not substantially for the gas industry of Ireland, but literally for the whole of it.

In Praise of Verticals.

Those who have had experience of continuous vertical retorts are invariably enthusiastic concerning their operation. Mr. James L. Hyslop, Chief Assistant to the Belfast Corporation Gas Department, is no exception; and the paper which he read before the Irish Association of Gas Managers at their recent meeting is a masterly treatise on the subject of continuous carbonization in vertical retorts—a treatise which might well be entitled "In Praise of Verticals." The fact that a large portion of the gas in nearly two hundred towns in Great Britain is now made in vertical retort plants is sufficient indication that many others share Mr. Hyslop's view that continuous vertical carbonization is an excellent proposition, but it does not follow that they are wholly in agreement with his assertion that the process is a more scientific one than carbonization in horizontals—that it requires the exercise of a higher degree of skill in control and supervision, since "various factors which have little or no effect upon horizontal working come into play and affect both the working of the plant and the results obtained." We know of horizontal installations where an extreme degree of scientific control is brought to bear on every phase of their operation; and the results prove beyond shadow of doubt that the application of science is essential if the horizontal system is to yield that of which it is capable. The only valid comparison between horizontals and verticals is when both are scientifically controlled—and such a comparison indicates that there is little difference in the labour costs of a modern horizontal retort house and of the present-day vertical retort plant, and that the reason which has led gas suppliers to adopt vertical retorts in several instances is the necessity of obtaining the largest possible output of gas upon a given ground area.

Careful study of Mr. Hyslop's excellent paper will be amply repaid. He speaks of the control which may be exerted upon the residuals market by the production of either a high or a low thermal yield of gas per ton in verticals. Of course, the same thing applies to intermittent chambers; it is only a question of steaming. In intermittent chambers also, sudden fluctuations in the demand for gas can be met by temporary alteration of the rate of throughput. With verticals, as Mr. Hyslop mentions, the yield of gas depends on the extent of steaming. Regarding this, we think it is highly misleading to express the thermal yield of gas "per ton of coal carbonized." The thermal content of the steam employed must be taken into consideration; and because of this, we are not in the least impressed when we hear that in one year an undertaking reports that the gaseous yield per ton of coal carbonized in its verticals has increased—a practice of the past which, unfortunately, still prevails. The fact that in continuous vertical retorts the coke is discharged in a cool state is one of the chief virtues of the system; and the effect of the heat conservation which this implies is stressed by Mr. Hyslop, who observes that the sensible heat of the coke—in other systems dissipated—is translated into steam in the waste-heat boilers. "It should be taken into account," he states, "that in verticals there is a much larger amount of heat available for steam-raising in the outgoing waste gases." How much of this heat, we wonder, is the sensible heat of the coke, and how much is due to leakage through the retort walls? As Mr. H. Hollings, Chief Gas Chemist to the Gas Light and Coke Company, stated in his paper before The Institution of Gas Engineers at the meeting in Cardiff last June, there is more leakage from vertical retorts than from horizontals. A reason for this is naturally sought. Perhaps it is because in the static carbonization in horizontal retorts and in vertical chambers of the intermittent type a plastic layer is set up which acts as a barrier to the gases evolved during the carbonization process, and prevents, or helps to prevent, their escape via the retort walls. In the dynamic process of carbonization in continuous vertical retorts, however, this plastic layer is not formed, with the result that the escape of valuable gaseous therms from the retort into the setting is more pronounced. How does this influence the output of steam from the waste-heat boilers?

Turning to another aspect of continuous vertical carbonization discussed by Mr. Hyslop, we observe that, regarding the effect of coal size, though he points to the adverse conditions set up by fines in the charge, he is of opinion that the practice of using fines in horizontal retorts, and the screened coal in the verticals—by those undertakings possessed of both types of plant—is not likely to meet with general approval in view of the cost involved. The handling of the coal will, he thinks, nullify the economic benefits which might be derived—an idea which hardly tallies with the experience of Mr. Thomas Carmichael at Portsmouth. We conclude this note on Mr. Hyslop's valuable contribution by calling attention to his trenchant observations on the effect of efficient producer practice. His remarks in this direction are worthy of the closest study.

Dual System of Charging for Gas.

It will be agreed at once that no one remedy is likely to meet every condition; and it should be equally readily admitted that a gas undertaking ought to be allowed the utmost practicable freedom to select just that form of remedy which it considers best suited to its own particular requirements. At the end of 1927 electricity was introduced into Donaghadee; and for the first time in his experience, Mr. W. H. Roberts, the Gas Engineer there, found himself in competition with it. This is a fate which has overtaken, or will overtake, the managers of many other of the smaller undertakings throughout Ireland; and it was therefore exceedingly appropriate that Mr. Roberts should contribute to the proceedings of the recent annual meeting of the Irish Association of Gas Managers a paper in which he briefly explained the steps taken to meet this new condition of affairs. However confident one may feel of the good qualities of the commodity one is dispensing, the appearance of an altogether new competitor certainly calls for active steps of some kind; and in the case of a gas undertaking confronted with an electricity supply, more favourable rates of charge naturally first suggest themselves.

This is, of course, one of the matters in which statutory gas undertakings are not at the present moment free agents; but it is to be hoped that soon they may be permitted, should they so desire, to work out their salvation by means of some other method of charge than the flat-rate system. Meanwhile, however, non-statutory undertakings have been able to do somewhat more in this respect; and there are a good many of these concerns in Ireland. To them, perhaps, Mr. Roberts' paper made particular appeal; for he outlined a competitive system of charging for his gas which is simple, and at the same time has been found to work satisfactorily. He confessed that one of his greatest difficulties was to get down to a sufficiently simple system; but he did right in persevering, for in a matter of this kind unnecessary complication is to be avoided at all costs. The working of Mr. Roberts' rateable value system is easily understood; and those who have adopted it are well pleased. Substantial increases in consumption by them have assured the pioneer that he has started out on the right path. All consumers now in Donaghadee have the choice of a flat rate of 6s. 8d. per 1000 c.ft., or the following terms: On payment of a sum per quarter, based on the Poor Law valuation of the property supplied, all the gas consumed on the property will be charged at the rate of 3s. 4d. per 1000 c.ft. The fixed sums paid per quarter are: For houses under £5 valuation, 11s. 8d.; under £8, 15s.; under £15, 16s. 8d.; under £20, 20s. 10d.; under £25, 25s.; under £35, 29s. 2d.; and so on. In a house of £25 valuation, 30,000 c.ft. of gas must be consumed before any benefit is derived from the scheme; but all consumed over that will only cost 3s. 4d. per 1000 c.ft. In this way Mr. Roberts offers a substantial inducement to increased consumption, and by a method which no one should find difficulty in understanding. He has thus secured, to meet his own case, the two main things to be aimed at in the establishment of such a dual system of charge.

A Secret of Success.

It is gratifying to be able to record to-day the honouring of Sir Arthur Duckham, K.C.B., by the staff of his Companies, on the eve of his departure for Australia, in the capacity of leader of the Economic Mission to Australia. To employ sadly mixed metaphor, Sir Arthur has nailed his colours to the mast of team work in the very best sense of the term; and we regard this as one of the main reasons of his success. It is just that which rendered possible his acceptance of the important appointment with which he has been entrusted; for as he said on the occasion of the silver wedding presentation recorded to-day, it is his complete confidence in those working with him that makes it possible for him to leave the country for six months, and thus fulfil a national service. Sir Arthur's acknowledgement of all he owes to the co-operation and loyal service of his colleagues and staff displays the true spirit of team work.

Possibilities and a High Attainment.

In the course of the Presidential Address which he delivered last June before The Institution of Gas Engineers, Mr. H. D. Madden examined the possibilities of increasing the output of gas, and pointed out that at the present time the greatest use of gas *per capita* is to be found in the United States of America, where the cost per 1000 c.ft. is dear compared with what prevails in this country. The American *per capita* consumption figures quoted by Mr. Madden were: Washington, 12,837 c.ft.; San Francisco, 12,392 c.ft.; and New York, 12,325 c.ft. These figures were sufficiently striking to point Mr. Madden's moral; but they are exceeded, we learn, in the case of the Consolidated Gas, Electric Light, and Power Company of Baltimore, who report a consumption *per capita* for 1927 of 13,708 c.ft., or about 7 p.ct. higher than Washington. Mr. Douglass Burnett, the Manager, is to be heartily congratulated upon the results attained. Circumstances, of course, differ; and there are loads in the United States which it may be difficult, or even impossible, to secure here. These figures should, however, always be kept in mind, as showing what gas may hope to accomplish under suitable conditions.

Problem of Unemployment.

There will be small quarrel with the dictum that "the problem of unemployment in the distressed industries is one which can only be solved if the whole community realizes its existence and consciously resolves to grapple with it." There is no fault to be found with the principle; it is when means come to be considered that difficulty is likely to be experienced. Mr. Baldwin has made a direct appeal to all employers to see what they can do individually in the way of finding openings for unemployed persons. This we have no doubt they will do to the utmost of their ability—through the impelling force both of patriotic feeling and of self-interest; for there can be no doubt that all-round gain results from useful employment being found for every additional man or woman. But the keeping in mind of the word "useful" is essential; for overstaffing can result in no permanent good in connection with any competitive industry. With the best will in the world, the making of openings which will not result in over-manning is no easy task. In fact, by a curious coincidence, just when Mr. Baldwin is making this appeal a Government Department has felt compelled to award a large contract for bronze wire to a French firm. Without in any way impugning the judgment of the Government Department concerned, it may be remarked that this necessity for sending out of the country work that is so badly needed here does do something to indicate the complicated nature of the problem by which our industrialists are confronted, when endeavouring to make the new openings for employment for which Mr. Baldwin appeals.

New Material Testing Association.

Careful consideration may be urged of a circular-letter, the terms of which are set out in this issue of the "JOURNAL," announcing the intentions of the New International Association for Testing Materials, which was formed last year in Amsterdam. This Association takes the place of an earlier one, which was in active existence before 1914, but was brought to an end by the war. Widespread growth in the magnitude of building and engineering structures, plant installations, &c., calls for a continually increasing amount of attention to the proper testing of materials; and though it has not been thought desirable to add to the large number of existing Societies and Institutions in this country by the formation of a British Society for Testing Materials, recognition of the desirability of securing satisfactory British support for an international movement of such importance as is represented by the inauguration of this new Association has led to the formation of a British Committee. This Committee have appointed Dr. W. Rosenhain, F.R.S., to act as British representative on the Permanent Committee of the International Association. It is to be hoped that a sufficient measure of support will be forthcoming in this country to satisfy the British Committee, who are anxious that our status and prestige in the International Association should be fully maintained, not only on the Permanent Committee, but also in the general work of the Association.

Steam Accumulators and Smoke Abatement.

In the "JOURNAL" for Aug. 15, mention was made of the splendid way in which the increasing use of gas is mitigating the smoke nuisance, particularly in regard to acidic pollution. Regarding the emission of black smoke from industrial stacks of coal-fired boilers, however, it is interesting to consider whether any modification of steam-raising plant could assist in its diminution. It is characteristic of most heat-consuming industries that the demand for steam varies widely throughout the day, due to the consumers being brought into operation at irregular intervals. The result of this, it is pointed out by Ruths Steam Storage, Ltd., in one of their recent publications of a scientific nature, is that the boiler house has to carry a violently fluctuating load for which it is not at all adapted. In consequence, the rate of firing must be continuously altered, and the boiler house attendants have to concentrate their attention on the boiler pressure gauge instead of attending to the adjustment of the draught and the adjustment of the firebed to obtain complete combustion. This gives rise to the production of black smoke. Steam accumulators enable the boiler plant to be run for prolonged periods at constant load, any surplus steam generated over and above the momentary requirements of the manufacturing plant being stored in the accumulator, from which it is recovered instantaneously to meet peak load demands. Attention, therefore, may be devoted exclusively to efficient firing.

The "Gas Salesman."

With this week's "JOURNAL" is issued the August "SALESMAN," which contains much of interest not only to the service staffs of gas undertakings but to their chiefs and administrators. We would call special attention to the announcement of the forthcoming Industrial Salesman's meeting on Sept. 28, and to the suggested arrangement for the next Gas Salesman's Day. Illustrated articles include a description of the "I.C.G.A." showrooms in Antwerp, and an account of the joint gas exhibit at the Yorkshire Show.

PERSONAL.

Mr. T. V. BLAKE, Chemical Assistant to the Engineer at the Grangetown Works of the Cardiff Gas Light and Coke Company, has been appointed Senior Shift Superintendent at the Bradford Road Works of the Manchester Corporation Gas Department. Mr. Blake entered the service of the Cardiff Company as Chief Chemist in 1919, and was promoted to his present position in 1924. He is this year's President of the Wales and Monmouthshire Junior Gas Association, and is also a member of The Institution of Gas Engineers, of which he obtained the Diploma in Gas Engineering at the 1924 Examinations.

Mr. J. O. V. IRMINGER, who has for many years resided in Copenhagen, celebrated his eightieth birthday there on Friday, Aug. 17. His son, his son's wife, and family, from Bergen, were present. Among the numerous messages of congratulation and felicity addressed to Mr. and Mrs. Irminger was one from The Institution of Gas Engineers, of which, and of its predecessor, he has been a distinguished member for a very long period. It will be recalled that Mr. Irminger is an authority on the construction of gasholders, and he still takes a keen interest in all gas affairs. His wife, Mrs. Caroline Irminger, is a composer of published music well known in Denmark. We heartily join in congratulations to a friend who has won a warm place in the hearts of many British gas engineers.

Mr. WALTER T. DUNN, Secretary of The Institution of Gas Engineers, who, as already announced in the "JOURNAL," is taking a holiday in Norway, has arrived at Bergen, and is calling on Mr. J. Irminger, Chief Engineer of the Municipal Gas-Works there, who was present at the meeting of the Institution in Cardiff last June to represent the Norwegian Gas Association and the Danish Association of Gas Engineers. After a few days at Bergen—which, by the way, is the second largest town in Norway, and is to a great extent publicly lighted by gas—Mr. Dunn intends returning in time for the meeting of the North British Association of Gas Managers.

Mr. JAMES LAWSON, who recently resigned his appointment as Managing Director of Messrs. E. Cockey & Sons, Ltd., gas-works plant and constructional engineers, Frome, Somerset, which post he had held for the last thirteen years, has joined the firm of Messrs. Bamag-Meguin (G.B.), Ltd., engineers and contractors, Broadway Buildings, Westminster, S.W. 1.

North British Association of Gas Managers.—Acting under medical advice, Dr. Carpenter has found it necessary to postpone his delivery of the William Young Memorial Lecture, which he was to have given at the forthcoming meeting of the North British Association of Gas Managers. His place will be taken by Mr. E. V. Evans, F.I.C., O.B.E., who will deal in his address with coal carbonizing problems.

Eastern Counties Gas Managers' Association.—We learn from the Hon. Secretary and Treasurer (Mr. E. F. Keable) that the autumn meeting of the Association will take place in London on Thursday, Oct. 18, under the Presidency of Mr. J. B. Hansford, of Bedford. Details of the proceedings will be announced later.

Ceramic Society.—The twentieth meeting of the Refractory Materials Section of the Ceramic Society will be held in Glasgow on Thursday and Friday, Sept. 13 and 14. The headquarters of the Society will be the Central Hotel; and the meetings will be held each forenoon in the Societies' Room of the Royal Technical College, George Street.

PRESENTATION TO SIR ARTHUR AND LADY DUCKHAM.

Tuesday, Aug. 21, was the occasion of an informal gathering at Allington House, Victoria Street, when Sir Arthur and Lady Duckham were presented with a handsome George III. silver tea set (Alice and George Burrows, London, 1811) on the occasion of their silver wedding, by the staff of the Woodall-Duckham Companies.

In making the presentation, Mr. F. B. Richards (Managing Director of Arthur Duckham & Co. (1920), Ltd.) said that the gift was the result of the spontaneous wish of the staff to commemorate the occasion. It also gave an opportunity of recognizing the great honour which the Government had conferred on Sir Arthur by entrusting to him the leadership of the Economic Mission to Australia.

In a brief reply, Sir Arthur said that 25 years ago he had launched out on two big ventures in the same year—marriage and the continuous vertical retort. He believed he had been able to achieve success in both—the former by the partnership of his wife, and the second by the co-operation and loyal service of his colleagues and staff. It was his complete confidence in those working with him that made it possible for him to leave the country for six months, and thus fulfil a national service.

Lady Duckham also suitably responded.

FORTHCOMING ENGAGEMENTS.

Sept. 4.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council meeting in the afternoon.
Sept. 5.—MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.—Visit to Liverpool.
Sept. 5-7.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual general meeting in Edinburgh.
Sept. 19.—BRITISH COMMERCIAL GAS ASSOCIATION.—Meetings of the Executive and General Committees, in London.
Oct. 11.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Autumn meeting in Birmingham.
Oct. 18.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Autumn meeting in London.
Oct. 22-24.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Conference at York.
Nov. 22.—SOCIETY OF BRITISH GAS INDUSTRIES.—Autumn general meeting. Hotel Cecil.

THE INSTITUTION OF GAS ENGINEERS.

All meetings take place in the Council Room at 28, Grosvenor Gardens, unless otherwise stated.

Sept. 11.—Benevolent Fund Committee of Management.
Sept. 18.—Finance and Executive Committees in the morning; Council meeting in the afternoon.

Manchester District Junior Gas Association.—The President, Mr. F. B. Small, F.C.S., of the Linacre Gas-Works, Liverpool, has invited the members of the Association, along with their ladies, to visit Liverpool on Wednesday, Sept. 5. The assembly will be at (not on) the Pier Head Station, Overhead Railway, at 1.10 p.m. The party will be conducted over the White Star Liner "Cedric." Mr. H. J. Hailstone, A.M.I.Chem.E., will be installed as President during the afternoon.

THE GAS INDUSTRY IN GERMANY.

The Annual General Meeting of the German Gas Association—the sixty-ninth of the series—was held this year in Hamburg, from June 14 to 16, under the Presidency of Direktor Kühne, of Berlin. An account of the proceedings was given in our contemporary, "Das Gas- und Wasserfach," for June 23, which reports that the attendance was easily a record one for post-war years, and possibly for all meetings of the Association. The list of representatives of other countries who attended is certainly very imposing—the absence of a delegate from The Institution of Gas Engineers being recognized as entirely due to the simultaneous meeting at Cardiff.

The general business was largely of a domestic nature, and calls for little comment. Reorganization of the German Association has been taking place, and much of the Council's report was devoted to this. The report of the proceedings attributed the record attendance, both of members and visitors from other countries, to interest in general developments which are taking place in the German gas industry, and especially in regard to the coke-oven gas supply scheme and research in brown-coal distillation. The long-distance supply scheme from the Ruhr mines has been referred to on various occasions in our columns, and the magnitude of its conception has aroused world-wide interest. As a matter of fact, the promoters have scored a big triumph this year in obtaining a contract with the important city of Hanover, and it is disappointing to find little reference to the whole matter in the report of the Association proceedings. It was dismissed in the President's address with a brief reference to the memorandum which was issued last September in the name of the Association, to which, apparently, there is nothing to add.

The President called attention to the large-scale exhibition—"Gas and Water"—which is planned for next year in Berlin, where also the meeting of the Association will take place at the same time. The response of the industries has been fairly good, but there is still room for improvement.

The progress of the industry is illustrated by consumption figures which are included in the Committee's report. The increase for the year 1927, estimated on a very large number of returns, amounted to 6·48 p.ct. It is interesting to note that the best results were recorded by works having a monthly output between 2·8 and 14 million c.ft.; this group showing an increase of 8·15 p.ct. Curiously enough, much of the improvement in trading is attributed to the enormous interest which the Ruhr scheme has evoked, and the attention which it has focussed on the advantages of gas.

We are awaiting the publication of the papers read, which have not yet been reproduced in our contemporary. Several of them are on interesting subjects, and we shall hope to give abstracts in due course. Herr Körting, of Berlin, dealt with coal selection and blending, and described how the gas make per ton had been improved by this means by about 45 p.ct. between 1913 and 1927. Prof. Terres discussed the internal processes of producers, and Herr Müller read a paper on the Hamburg Gas-Works, with a discussion on the present-day problems of the German gas industry. From this we shall hope to learn something of interest regarding the coke-oven scheme. Other papers on highly topical subjects dealt with recent developments in gas production from brown coal, which is at present receiving a great deal of attention; the brown-coal fields having central gas supply schemes in the making similar to that of the Ruhr.

ON THE ELECTRICAL SIDE.

Underground Electricity Stations.

A suggestion which opens up fresh possibilities in a harassed age has been made in a letter to "The Times" by Mr. G. W. Keats, Electrical Engineer to the Borough of Woolwich, who says that, although the risks and possibilities of air attacks are known, apparently nothing is being done to ensure that our emergency lighting and power supplies are made immune from hostile attack. What he has in mind is not that all generating stations should be placed underground for general supply purposes, but that the expenditure involved would be justified on at least two suitably situated underground generating stations. The writer of the letter rightly argues that it is of paramount importance that our supply of light and power should be absolutely protected in any emergency which may arise in the future; and a couple of stations, kept in reserve if necessary, would go a long way to ensuring that these essential services are maintained.

Comparing American and English Rates.

Setting itself to answer the question: "Is Electricity Dear in Great Britain?" the "Electrical Times" has drawn up a number of comparisons with American prices of charges made in this country; and the result is to show that, generally speaking (there are, of course, exceptions on both sides), electricity in Great Britain is not only cheaper than it is in the United States, but it is much cheaper. What our contemporary has done is to endeavour to find out what would be the relative prices paid in the United States and in Great Britain by the domestic user who desired to employ electricity fairly freely in his house. The calculations made are based upon the assumption that the house is rated at £40 per annum and consuming 400 units for lighting and 4000 for other domestic purposes. This does not, of course, mean that such an amount would necessarily be consumed.

In certain typical instances in the United States, the annual account of such a consumer would be as follows:

	£	s.	d.
Cleveland Company—960 units at 2½d. and 3440 at 2d.	38	13	4
Commonwealth Edison Company—288 units at 4d., 288 at 3d., and 3834 at 1½d.	32	6	4
Detroit Edison Company—288 units at 5d., and 4112 at 2d.	40	5	4
Edison Electric Illuminating Company—288 units at 4½d., 576 at 2½d., and 3636 at 1½d.	34	2	6
Pacific Gas and Electric Company—Fixed charge of £1, 2400 units at 2½d., and 2000 at 1½d.	38	10	0

To compare with these, there are given below the charges of a group of twenty of the largest industrial towns in this country. The rates are taken from a list compiled last March, but corrected as far as possible to date. It is probable that in some cases reductions have been made which have not been noted. In several instances, too, a discount is allowed for prompt payment. For one reason or another a few large towns have not been included.

	£	s.	d.
Aberdeen—12½ p.ct. r.v. and 4400 units at ½d.	14	15	10
Bradford—17½ p.ct. r.v., 80 units at 1d., and 4320 at ½d.	16	6	8
Bristol—17½ p.ct. r.v. and 4400 units at 1d.	25	6	8
Cardiff—12 p.ct. r.v. and 4400 units at ¾d.	18	11	0
Hull—15 p.ct. r.v. and 4400 units at ¾d.	19	15	0
Leeds—15 p.ct. r.v. and 4400 units at ½d.	15	3	4
Leicester—4s. 8d. per lamp-holder p.a. and 4400 units at 1d. Allow 16 lamp-holders and 4400 units	22	1	4
Liverpool—20 p.ct. r.v. and 4400 units at ½d.	17	3	4
Manchester—20 p.ct. r.v. and 4400 units at ½d.	17	3	4
Newcastle-upon-Tyne—1s. per room summer and 2s. winter (allow 8 rooms), *plus* 4400 units at 1d.	20	14	8
Norwich—12½ p.ct. r.v. and 4400 units at 1d.	23	6	8
Preston—20 p.ct. r.v. and 4400 units at 1d.	26	6	8
Salford—12 p.ct. r.v. and 4400 units at ¾d.	16	19	5
Sheffield—10 p.ct. r.v. and 4400 units at ½d.	13	3	4
Southampton—2s. per room summer and 4s. winter (allow 8 rooms) and 4400 units at ¾d.	18	11	0
South Shields—320 units at 6d., and 4080 at ¾d.	20	15	0
Stockport—20 p.ct. r.v. and 4400 units at ¾d.	21	15	0
Stoke—5s. per room per quarter (allow 8 rooms), 1920 units at 1d., 1920 at ¾d., and 560 at ½d.	23	3	4
Sunderland—15 p.ct. r.v., 640 units at 1d., 3760 at ½d.	16	13	0
Wolverhampton—12½ p.ct. r.v. and 4400 units at ½d.	17	2	4

The five American Companies quoted supply no fewer than 1,937,385 residential consumers, who in the last recorded year took 1,140,932,514 units; but in the case of every one of the twenty large towns quoted above, the cost to the consumer is far below that ruling in the territories of these five American Companies. As a matter of fact, the arithmetical average works out at £19 1s., as against the lowest American price of £32 6s. 4d. In the Greater London area, as might have been expected, the difference is not quite so marked; but the arithmetical average price of 47 supply undertakings in this area which our contemporary quotes is only just over £26.

All-Electric Houses.

In connection with two housing schemes, the Electrical Engineer has submitted to the Middleton Town Council proposals for all-electric supplies. The suggested arrangement would provide for lighting, cooking, and wash-boiler, with spare points in the hall and landing upstairs, a ten-gallon hot water cistern for the bath, and a five-gallon hot water cistern for domestic use, each of which would be heated during the night under thermostatic control. The tariff would be the Corporation "all-in" tariff—namely, 20 p.ct. of the net rateable value per annum (12s. per house per quarter), *plus* ¾d. per unit metered for electrical energy consumed for lighting and domestic purposes; but electrical energy consumed during the night period for water heating would be charged at ½d. per unit metered. The cost, based on a comparison with the electricity consumption in existing houses, would vary from £3 5s. per quarter where both hot water cisterns were in operation each night, to £2 10s. per quarter where the ten-gallon cistern was only switched on for one night a week.

NEW INTERNATIONAL ASSOCIATION FOR TESTING MATERIALS.

At a congress held in Amsterdam in 1927, the New International Association for Testing Materials was formed. An International Association for Testing Materials of Construction was in active existence before 1914, and held a series of congresses—the last in New York in 1912. The existence of this earlier Association was brought to an end by the war; and for many reasons British opinion was averse to the revival of the old Association. The activities of the British representatives at Amsterdam resulted in the adoption of a new, and much simpler and more satisfactory, organization for the new Association. In particular, the whole question of International Standard Specifications has been entirely eliminated from their activities.

In most countries there are National Associations for Testing Materials; but it has not been thought desirable to add to the large number of existing Societies and Institutions in this country by the formation of a British Society for Testing Materials. In order to secure adequate British representation in the New International Testing Association, however, and to secure satisfactory British support for an international movement of such importance, a British Committee has been formed. This consists of representatives appointed by a number of the most important British Institutions and Societies interested in materials of all kinds. The British Committee have appointed Dr. W. Rosenhain, F.R.S., to act as British representative on the Permanent Committee of the International Association, of which body he has since been elected a Vice-President. The Permanent Committee has likewise established four International Committees to deal respectively with each of the four sections into which the work is to be divided—metals; inorganic non-metallic materials (cement, concrete, &c.); organic materials (oil, india-rubber, &c.); and methods of testing.

The British Committee are anxious that the status of this country and prestige in the International Association should be fully maintained, not only on the Permanent Committee, but also in the general work of the Association, and at the next international congress, which is to be held in Zurich in 1931. Adequate British representation at these congresses, not only by the presence of a sufficient number of British members, but by the presentation of papers and reports and participation in discussions, is very important. In the interest of the science and art of testing in this country, and the progress of materials generally, it is most desirable that British technologists—and especially engineers and chemists—should avail themselves fully of the international interchange of experience and ideas which takes place, formally and informally, at the international congresses. It is also important that British status should be properly maintained at such congresses, as this has an important reflex effect on British trade abroad.

In order to make a widespread membership possible, the subscription has been kept at the nominal sum of 10s. per annum for individual members, and not less than double per annum for societies, firms, and undertakings in their corporate capacity. No entrance fees or formalities are required. While membership and subscriptions are invited primarily for the purpose of supporting the important work of the Association—and especially for maintaining adequate British participation—members will receive a periodical bulletin keeping them informed of the activities of the Association. Members of several years' standing will be entitled to certain privileges in regard to congress fees and the purchase of "Proceedings" at reduced prices. It is also hoped to organize arrangements for the visit of British members to the Zurich Congress in 1931.

Membership applications and remittances should be sent to Mr. G. C. Lloyd, Hon. Secretary and Treasurer, 28, Victoria Street, London, S.W.1.

POTENTIAL INVESTMENTS.

XV.—ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The Alliance and Dublin Consumers' Gas Company was established in the year 1845 as the Dublin Consumers' Gas Company, incorporated under the present name two years later, and re-incorporated by Special Act in 1866. Offices: 24A, D'Olier Street, Dublin. The statutory area of supply covers about 44 sq. miles, including Dublin, Pembroke, Rathmines and Rathgar, Blackrock, Dun Laoghaire, Balkey, Killiney, Bray, Dundrum, Terenure, and Rathfarnham. The population supplied is about 460,000, and the consumers number 72,937.

The capital of the Company as shown by the last accounts (Dec. 31, 1927) is as follows:

Capital Stock.

	£
5 p.ct. standard ordinary	1,551,868
Remaining to be issued	300,000
Total amount authorized	£1,851,868

Loan Capital.

	£
4 p.ct. debenture stock	374,000
Remaining to be borrowed	100,000
Total amount authorized	£474,000
Premiums received on ordinary stock	£72,102
,, ,, debenture stock	6,458
	£78,560

Transfer Arrangements: Common form. Fee for registration of transfer, probate, death in joint holdings, marriage, or power of attorney, 2s. 6d. Stocks (separate deed for each class) are transferable in multiples of £1. Smallest holdings allowed: Ordinary, £10; debenture, £5. Husband's witness of wife's signature or *vice versa* not accepted. Voting: 1 vote for every £10 stock up to £100; 1 for every £50 beyond up to £1000; and 1 for every £100 beyond. Directors' qualification, £1000.

Accounts and Dividends: Accounts made up to June 30 and Dec. 31, and submitted in September and March; dividends being paid about Oct. 10 and April 10. The standard price is 1s. 3d. per therm; present price, 10¾d. per therm; declared calorific value, 475 B.Th.U. per c.ft. Dividends on the ordinary stock are subject to sliding-scale, viz., ⅛d. per therm above or below the standard price = ⅛ p.ct. in half-year's dividend.

The following table illustrates the progress made by the Company prior to the war and during the past five years. The years 1914 to 1922 are purposely ignored, owing to the abnormal conditions then prevailing.

It will be seen by the above statement that no progress was made by the Company between the years 1903 and 1913. In fact, the gas sold in the latter year was less than in 1903. Since 1923, however, the improvement has been remarkable. The sales show an increase of nearly 40 p.ct.; the capital employed has decreased from 3s. 11d. to 2s. 11·5d. per therm; and the dividend has increased from 5¾ p.ct. to 7 p.ct. The capital is still high for a company of this size; but it is evident that the present Directors appreciate the necessity of reducing the amount to a more normal figure.

Year.	Average Gross Selling Price of Gas in Company's Principal Area. Per 1000 C.Ft.	Quantity Sold. Thousands C.Ft.	Capital Employed per 1000 C.Ft. Sold.	Gross Profit.	Total Charge for Capital.*	Rates of Dividend. P.Ct per Annum on 10 P.Ct. and 7 P.Ct. Stocks.	Amount Carried Forward and Balance Reserve Fund.
	s. d.		s. d.	£	£	£	£
1903	3 4	1,454,088	15 8	91,463	89,492	10 10 0 / 7 10 0	68,703
1908	3 7	1,402,430	17 10	71,817	88,389	10 0 0 / 7 0 0	43,255
						5 P.Ct. Ordinary Stock.	
1913	3 5 Per Therm. d.	1,422,285 Therms.	19 3 Per Therm. s. d.	70,484	68,281	3 5 0	50,206
1923	15·5	6,772,178	3 11	126,498	121,215	5 15 0	65,576
1924	13·0	6,851,484	3 11	121,496	126,422	6 5 0	78,297
1925	13·0	7,528,562	3 7	125,461	113,316	6 5 0	93,185
1926	12·4	8,598,519	3 2	110,279	118,200	6 12 6	84,426
1927	11·8	9,379,865	2 11	156,423	125,078	7 0 0	111,153

* The total charge for capital includes dividend and interest paid and amount (if any) carried to reserve fund.

NOTE.—Under the Company's Special Act of 1909, the 10 p.ct. and 7 p.ct. standard stocks were converted into 5 p.ct. ordinary stock.

The following table shows the highest and lowest prices of the stock transactions on the London Exchange during the past five years, the dividends paid, and the yield p.ct. per annum calculated at the average price.

Ordinary Stock.

Year.	Transactions. Highest.	Transactions. Lowest.	Dividend.	Yield P.Ct. per Annum on the Average Price.
			£ s. d.	£ s. d.
1923	75¾	60	5 15 0	8 9 5
1924	74¼	61¼	6 5 0	9 4 6
1925	71	63	6 5 0	9 6 7
1926	85	68½	6 12 6	8 12 11
1927	94	81½	7 0 0	7 19 6

The present quotation is 94-97; and having regard to the present *authorized* dividend (£7 12s. 6d. p.ct.), the stock is a very attractive proposition.

IRISH ASSOCIATION OF GAS MANAGERS.

PAPERS AND DISCUSSION.

The Presidential Address of Mr. William Millar, of Cookstown, and the general proceedings at the annual meeting of the Association in Belfast on Tuesday, Aug. 14, were reported in last week's "JOURNAL." To-day we publish the two papers read, together with the combined discussion upon them.

CARBONIZATION IN VERTICAL RETORTS.

By JAMES L. HYSLOP, Chief Assistant, Belfast Corporation Gas-Works.

As a result of the advances made in recent years in the quality of refractory materials and in the general design of the plant, the carbonization process has now reached a higher degree of efficiency in continuous vertical retorts than in any other form of gas-making plant; about 85 p.ct. of the potential heat in coal being returned in one form or another to the consumer. This high efficiency is made possible by the fact that the vertical retort installation is capable of such a variety of adjustment that the carbonizing conditions may be controlled to suit the requirements of any particular class of coal; and, the process being continuous, the carbonizing period may be varied to any desired extent without disorganization of the charging and discharging routine. The process is a more scientific one than carbonization in horizontals, and requires the exercise of a higher degree of skill in control and supervision, for various factors which have little or no effect upon horizontal working come into play and affect both the working of the plant and the results obtained. In this paper it is mainly with the effects upon the process of some of these factors that the writer intends to deal.

The plant is admirably adapted for taking full advantage of the practice of steaming, thus making possible the manufacture in one operation of the quality of gas which it is desired to supply; or, if the quality may be regulated by other means, a certain measure of control may be exerted upon the residuals market by the production of either a high or a low thermal yield of gas per ton, thereby varying the amount of coke and tar for disposal for a given output of gas. These features, combined with a limited capacity for meeting sudden fluctuations in the demand for gas by temporary alteration of the rate of throughput, give a flexibility to the system not obtained from any other type of carbonizing plant.

EFFECTS OF STEAMING.

The effects of steaming are well set out in the reports of the tests carried out by The Institution of Gas Engineers and by the Fuel Research Board; in one of the latter's tests the make of gas per ton was increased from 13,100 c.ft. at 544 B.Th.U., or 71·26 therms, without steam, to 22,580 c.ft. at 460 B.Th.U., or 103·8 therms, with 20 p.ct. steaming, with a corresponding increase of tar yield from 9·3 to 12·4 galls., and of ammonia from 16·27 lbs. to 22·2 lbs. of sulphate. These results were, of course, obtained in a test plant under skilled supervision; but equally good results have been obtained on several plants under normal working conditions.

The steaming process is sometimes criticized on account of the reduction in the yield of coke per ton of coal carbonized, but this is hardly justified. In the Fuel Research Board tests already quoted, the use of 20 p.ct. of steam resulted in a reduction in the coke yield of 137 lbs., and required the supply of an additional amount of heat to the setting, equivalent to 39 lbs. of coke used in the producer. The increase in gas yield for this total coke consumption of 176 lbs. was 32·54 therms; but if this number of therms was produced by the use of coke in the generator of a blue water gas plant, the amount used in the process would be about 435 lbs.—almost two and a half times the quantity used in the carbonizing plant.

OPERATION OF PRODUCERS.

The amount of coke available for sale plays such a large part in reducing the net cost of gas that any method by which it may be increased is worthy of attention. Of the total coke produced, from 20 to 25 p.ct. is used for heating the retorts, so that the operation of the producers offers a fruitful field for effecting economies; a saving of 1 lb. of fuel per 100 lbs. of coal carbonized representing a gain of 3d. per ton, or from 15 to 25 p.ct. of the total carbonizing wages.

In vertical settings the producer, being of the outside or semi-outside type, is designed solely from the point of view of efficiency of operation; no restrictions as to size or shape being imposed by the general design of the setting. Particular attention is paid to the reduction of operating costs by the elimination of arduous clinkering; clinker formation being prevented by the provision of a suitable water-cooled grate of large area, which has the effect of maintaining the fuel bed at a temperature below the fusion point of the ash in most classes of coke. Coke containing a large proportion of breeze can in consequence be successfully dealt with, and the lower temperature conditions assist in prolonging the life of the fireclay linings. The practical absence of clinker leads to great economies in working, for the producer may be operated for long periods without ashing-out, thus reducing labour costs; and with infrequent cleaning, the amount of coke withdrawn with the ashes may be kept very low. The length of the working period is, of course, determined by the quality of the coke in use. If this is subject to variation, and is liable at times to contain an ash of low fusion-point, ashing-out may have to be performed eight-hourly; but with fairly good coke of constant quality, the producer may be worked for sixteen or even twenty-four hours without attention.

An examination of the producer gas at different periods brings out two points of importance—first, that when the whole of a grate of this type is ashed-out at one operation, the quality of the producer gas is seriously reduced for several hours; and, secondly, that the quality of the gas continues to improve, without any appreciable reduction in volume, the longer the fuel bed is left undisturbed. This suggests the advisability of combining a long run with the cleaning of half of the producer only at one time. The results of experiments along these lines on the producers of our remodelled Glover-West settings, with a grate area of about 1·2 sq. ft. per ton of coal carbonized per day, are shown below. When ashing-out the whole of the grate eight-hourly, the analyses of the producer gas one hour after, and seven hours after the operation, with intermediate CO_2 percentages, were as follows:—

Producer Gas Analyses. Eight-Hour Period.

Hours after Ash-Out.	1	3	5	7
CO_2	8·8	5·1	3·4	2·8
O_2	*Nil*	..	..	*Nil*
CO	20·0	..	..	27·6
CH_4	0·3	..	..	0·8
H_2	11·9	..	..	8·6
N_2	59·0	..	..	60·2
Calorific value, B.Th.U. per c.ft.	105	..	..	124

The steady decrease in the carbon dioxide and the increase in the carbon monoxide percentage as the run proceeds will be noted.

The effect of a sixteen-hour run, cleaning one-half of the producer every eight hours, is also shown. In the type of producer under test, the full benefit of this method, from the point of view of maintenance of constant gas quality, is not obtained, for the gas enters two separate uptakes a few feet above the fuel bed, and, consequently, very little mixing of the steams from each half of the producer takes place. The result is that after ashing-out the left-hand half, the gas in the left-hand uptake contains from 6 to 10 p.ct. of carbon dioxide and 20 to 22 p.ct. of carbon monoxide, while the gas in the right-hand uptake contains from 3 to 4 p.ct. of carbon dioxide and 25 to 26·5 p.ct. of carbon monoxide. The analyses, however, show the variation in quality in one uptake at different periods of the sixteen-hour run of the corresponding half of the producer.

Producer Gas. Right-Hand Uptake Ashing-Out Half of Producer Eight-Hourly.

Hours after Ashing-Out Right-Hand Half	1	3	5	7	9	15
Hours after Ashing-Out Left-Hand Half	..	..	..	..	1	7
	Right-Hand Half Ashed Out.				Left-Hand Half Ashed Out.	
CO_2	7·7	4·1	2·9	2·7	3·8	1·6
O_2	*Nil*	..	..	*Nil*	*Nil*	*Nil*
CO	21·4	..	..	27·3	25·3	28·7
CH_4	0·4	..	..	1·4	0·9	1·1
H_2	10·3	..	..	7·0	8·2	6·0
N_2	60·2	..	..	61·6	61·8	62·6
Calorific value, B.Th.U. per c.ft.	105	..	..	123	116	122

These analyses confirm the advantages of the latter method of working. It will be noted that, though the quality of the gas in the uptake is reduced after cleaning the corresponding half of the producer, it returns to normal after about three hours, and there is little change in composition when the other half is cleaned. The variation during the last thirteen hours of

the run is in consequence very small, and the high percentage of carbon monoxide maintains the average quality at a high level. It is evident that, if the streams from each half of the producer could be effectively mixed, a continuous supply of gas of fairly constant composition and high quality would be maintained.

FUEL CONSUMPTION.

The fuel consumption of the continuous vertical retort, judging by some of the published figures, would appear at first sight to be somewhat high, but in drawing a comparison with horizontal results it should not be forgotten that the practice of steaming requires the expenditure of an additional amount of fuel, varying from 1 to 1·75 lbs. per 100 lbs. of coal carbonized with 20 p.ct. steaming—an expenditure which, as already shown, gives a proportionally high return in the form of gas.

It should also be taken into account that in verticals there is a much larger amount of heat available for steam-raising in the outgoing waste gases. In a horizontal setting the sensible heat in the waste gases leaving the regenerator is only about 35 p.ct. of the potential heat supplied to the producer, but in a vertical setting, owing to the facts that regenerators are replaced by other efficient methods of preheating the secondary air, that heat losses by radiation are lower, and that the coke is discharged from the retorts in a comparatively cool state, the heat in the waste gases represents from 50 to 55 p.ct. of the total heat supplied. By utilizing this heat for the generation of steam, it is therefore possible to recover from 35 to 40 p.ct. of the potential heat of the coke used in the producers—practically twice the amount available for horizontals.

WASTE-HEAT BOILERS.

In a modern installation full advantage is taken of this source of energy, either by the use of boilers working under natural draught or by the high-velocity fire-tube boiler with induced draught, which has been specially developed to deal with gases of low temperature. The former type is suitable for plants whose size does not warrant the installation of induced draught apparatus, and is capable of producing about 2 lbs. of steam per pound of coke used in the producers—more than sufficient to meet the demand of steam for the retorts. The fire-tube type reduces the temperature of the waste gases to about 230° C., 50° C. above the saturated steam temperature at 120 lbs. per sq. in. pressure, and is capable of producing approximately 4 lbs. of steam per pound of coke used, sufficient in many cases to meet the total steam requirements of the whole works for both power and process purposes. The amount of coke and breeze thus made available for sale can be estimated from the facts that a hand-fired boiler produces about 5 lbs. of steam per pound of breeze and from 8 to 10 lbs. per pound of good coke.

To maintain waste-heat boilers at their maximum efficiency, the first necessity is to prevent the formation of scale by reducing the hardness of the feed water to not more than 3 or 4 degrees; this being generally effected by means of water softening plant of the zeolite or the lime-soda type. The former method has much in its favour from the point of view of simplicity of operation, but when used with water of a high degree of temporary hardness, the water after treatment contains a large quantity of dissolved solids.

In the removal of permanent-hardness forming salts, both these processes produce the same quantity of soluble salts; and in dealing with temporary hardness salts, the lime-soda process leaves no soluble residue, whereas the zeolite process leaves 1·68 grains per gallon for each degree of temporary hardness. In a boiler of large capacity this is not of great consequence; but in small natural draught boilers with a high ratio of evaporation to water space, there is a natural tendency to priming, and this tendency is greater the higher the proportion of saline matter present. Frequent blowing-down has to be resorted to to maintain the salt concentration within reasonable limits; and even when this is done, trouble is sometimes experienced as a result of evaporation of the water carried forward, a deposit of salts being left in the steam pipes or at the steam nozzles on the retorts.

With induced draught boilers, infiltration of cold air into the waste gas flues has to be guarded against, otherwise the efficiency of heat recovery is seriously reduced. It is not uncommon for the CO_2 content of the gases to be reduced from 18 to 12 p.ct. in this manner, with a corresponding drop in temperature of about 250° C.—a reduction which represents the addition of a volume of air equal to 50 p.ct. of the original volume of the waste gases. The total amount of heat entering the boiler is the same in either case; but since the outlet temperature of the gases remains practically constant, the larger volume carries about 30 p.ct. of the available heat to the atmosphere, compared with 20 p.ct. with the smaller volume.

A periodical examination of the joints and brickwork between the waste gas flue and the setting is advisable, with a view to pointing-up any cracks which may have developed. A possible source of leakage, often overlooked because out of sight, is at the by-pass dampers to the chimneys. These dampers have the maximum pull of the fan on one side, and are open to the atmosphere on the other; and if badly shaped or badly fitted, they may allow large quantities of air to be drawn in.

FOUL MAINS AND GOVERNORS.

The maintenance of steady conditions of vacuum or pressure at the gas offtake of the retort has a decided influence both upon the yields and quality of products and upon the general working of the plant; and it is only by having foul mains of ample size, and a sensitive governor fitted as close to the collecting mains as possible, that these conditions can be maintained. As a rule, best working is obtained when the gas leaving the retorts is at atmospheric pressure; the gas offtake pipes under these conditions remaining moist and tarry, and no trouble being experienced with pipe stoppages. On the other hand, when the conditions fluctuate or when a heavy vacuum is maintained, besides the risk of drawing in quantities of air and furnace gases, the gas leaves the retort at an unnecessarily high temperature, and the tar in the ascension pipes becomes hard and dry. Pipe stoppages are frequent, and, though the quality of the gas is reduced, there is no apparent increase in quantity.

In some cases, owing to the general design of the plant, it is not possible to fit the governor close to the outlet from the collecting mains; and in such cases the main between the outlet and the governor must be of such a size that not more than two or three tenths vacuum is required at the governor inlet to maintain a vacuum of one-tenth at the collecting main. In this connection an interesting problem was presented by the foul main arrangement of one of our benches of five beds, reconstructed several years ago, in which it was found to be impossible to maintain steady conditions at the retorts without varying the governor counterbalance weight at very short intervals. The foul main was 18 in. in diameter and 33 ft. long, and the quantity of gas passing, after correcting for temperature and allowing for undecomposed steam, was, approximately, 176,000 c.ft. per hour. Calculated from the usual formulæ, this main should have been of ample size, but on investigation it was found that the vacuum at the governor inlet, to give two-tenths vacuum at the foul main inlet, varied between 8 and 10 tenths—a loss of from 6 to 8 tenths—although the governor was obviously working well within its capacity.

As a result of this experience, in the reconstruction of a bench recently carried out larger mains were specified, and the same quantity of gas from five beds was passed into a 24-in. main. With this main the vacuum at the governor inlet, to give one-tenth vacuum at the foul main inlet, was found to be about two-tenths, and under these conditions the governing was automatic and as near perfection as could be desired.

The necessity of keeping the vacuum at the governor inlet low is evident on considering the effect of variation in the make of gas. The governor is designed to maintain a constant vacuum, which may be varied at will, at the point at which it is fitted; and this it does effectively. The loss of vacuum in a main such as is under consideration varies directly as the square of the quantity of gas passing, so that a small increase in the volume involves a relatively large difference between the vacuum at the inlet of the main and the vacuum of the outlet; and since the governor maintains the outlet vacuum constant, the difference must be made up at the inlet—that is, at the top of the bench. It follows that if the vacuum absorbed by the main is normally small, with a constant small vacuum at the governor, the variation at the top of the bench is also small; but if the vacuum at the governor is large, the variation at the bench is also large. As is well known, the variation in the make of gas in verticals is small; nevertheless, this factor cannot be entirely ignored.

The point is illustrated by the following table, which shows a comparison between the conditions at the bench in the cases of the 18-in. and 24-in. mains already commented upon, with

Variation in Make of Gas.	18-In. Main.				24-In. Main.			
	Governor Inlet Vacuum. Tenths.	Absorbed by Main. Tenths.	Foul Main Inlet Vacuum. Tenths.	Conditions at Retorts. Tenths.	Governor Inlet Vacuum. Tenths.	Absorbed by Main. Tenths.	Foul Main Inlet Vacuum. Tenths.	Conditions at Retorts. Tenths.
15 p.ct. increase .	8	7·9	0·1	1·9 pressure	2	1·3	0·7	0·3 pressure
10 ,, ,, .	8	7·3	0·7	1·3 ,,	2	1·2	0·8	0·2 ,,
Normal . . .	8	6 0	2·0	0	2	1 0	1·0	0 ,,
10 p.ct. decrease .	8	4·8	3·2	1·2 vacuum	2	0·8	1·2	0·2 vacuum
15 ,, ,, .	8	4·3	3·7	1·7 ,,	2	0·7	1·3	0·3 ,,

constant vacuum at the governor inlet and 10 p.ct. and 15 p.ct. variations in the make of gas.

It is shown that, with a 15 p.ct. variation either way, the conditions at the retorts with the 18-in. main would vary from 1·9 tenths pressure to 1·7 tenths vacuum, while the corresponding variation with the 24-in. main would only be from 0·3 tenths pressure to 0·3 tenths vacuum. It is not, of course, likely that a 15 p.ct. variation would be met with in practice, and smaller variations would be dealt with by varying the governor counterbalance weights; but this brings into play the dependence upon the human element, which it is the function of the governor to obviate.

It may be mentioned that the trouble with the 18-in. main was eventually minimized by controlling the governor from the inlet of the main instead of from the outlet, thus allowing the governor to maintain a constant vacuum of two-tenths at this point automatically; but even with this alteration the conditions at the retorts are not so steady as on the bench where larger mains are provided.

EFFECT OF COAL QUALITY AND SIZE.

When steaming is practised in vertical retorts it is not coal quality alone that determines the ultimate results, for the size and condition of the coal as charged to the retorts plays almost as important a part. The extent to which the various distillation products undergo degradation in the retorts is largely dependent upon the resistance offered to their passage by the semi-coked charge; and the condition of the charge is in turn decided by the coking properties of the coal and by the state of sub-division of the particles. The presence of a large proportion of fines has the effect of giving a very dense charge through which the gas is unable to pass; and, as a result of its being forced to travel in contact with the hot walls of the retort, the tar and ammonia are to some extent decomposed. The condition of the charge does not allow of efficient contact between the steam and the coke, so that the increase of gas yield from this source does not attain its maximum, and the rate of heat transference to the charge being comparatively low, the throughput per retort is reduced. Irregular travel of the coal into the retort is much more likely to be experienced with a coal of this description than with a well-screened coal, due to the fact that the cold, tightly packed coal entering the retort tends to act as a filter for the tarry vapours, and condensation of these may give rise to caking. The tendency is greater the higher the proportion of fines present, but it may be overcome by working with higher temperatures near the top of the retort.

The charge from a well-screened coal produces an entirely different set of conditions within the retort; and higher yields per ton, and—of more importance—higher yields per unit of plant can be obtained by its use. It has been suggested, where both verticals and horizontals are in operation, that to obtain these higher yields the fines should be screened out from the coal going to the verticals, but this practice is not likely to meet with general approval in view of the increase in cost involved in the handling of the coal nullifying any possible beneficial effect upon the economic results.

For the combination of high yields per ton with high output per retort, a nut-size coal, about 2 in. to 1 in., is undoubtedly most suitable; not least among its many advantages being the regular manner in which it travels through the retorts, with very little rodding, even if the coal is of a highly coking character. The charge remains in a porous condition and affords an easy means of escape for the gases, with a minimum of decomposition, so that tar and ammonia yields are high. Conditions are favourable for maximum decomposition of the steam supplied, and a high yield of gas of rather lower quality is obtained, which in its passage through the retorts helps to promote more even heating of the charge. The coke from a nut-size coal is generally smaller and of more open texture than coke from unscreened coal; but with the present large and growing demand for small coke for domestic use, this can hardly be considered a disadvantage.

Though the continuous vertical retort responds quickly to changes in coal quality and size, it should not be assumed that it demands specially selected coals either of high quality or of particular size. Any class of coal can be carbonized, provided adjustment of the heat zones is possible; and such is the adaptability of suitably designed plant that it can readily be adjusted to produce the desired quality of gas from any particular coal, regularity of working being ensured by proper disposition of the heat zones. Particular care is, however, necessary if several different coals of widely varying characteristics are required to follow one another through the retort in rapid succession; for each size and quality of coal requires a definite rate of throughput and a definite percentage of steam to produce a given quality of gas. Since the throughput varies, with constant extractor speed, according to the size and hardness of the coke produced, adjustments have to be made, as the coal changes, to maintain constant calorific value. It is, however, advisable, when the supply is drawn from various sources, to procure coals of as nearly the same quality and size as possible, unless adequate facilities for thorough mixing are in existence; but the particular quality and size may be determined solely by considerations of cost and convenience of supply.

THERMAL YIELD AND COST OF GAS.

A good deal has been heard about the high thermal yields of gas which can be obtained from some classes of coal; and while these results are of great interest, the question which concerns the individual engineer is whether such coals will produce gas at the lowest cost per therm under the conditions which prevail in his own district. High thermal yields of gas do not materially affect the revenue from residuals per ton of coal carbonized, but they do seriously reduce the revenue from this source per therm of gas made. When higher yields of the requisite quality can be obtained from the particular coal in use by improvements in working and by better adjustment of the plant, this reduction of revenue is more than offset by the lower costs of coal and of working per therm of gas; and the net cost of the gas will be lower. When, however, they can only be obtained by the use of a higher quality coal, of correspondingly high cost, there is some doubt as to what the ultimate result will be. In most cases it will be found that, when there is a fairly good outlet for coke and tar, the lowest cost per therm will be obtained from a low-priced coal giving moderate yields of gas per ton, and larger quantities of residuals for disposal. This fact is borne out by a comparison of our results at Belfast for last year from low-priced coals yielding an average of 76 therms per ton, with the results that would have been expected from a coal giving 103·8 therms and yields of coke and tar such as were obtained in the Fuel Research Board test already quoted. The difference in coal cost is taken as 4s. 6d. per ton, which is believed to be reasonable, and it is assumed that working costs—*i.e.*, labour, fuel, purification, and maintenance—per ton of coal carbonized would have been the same in both cases; the increased cost of purifying the larger volume of gas from the higher quality coal being offset by the lower costs of handling the smaller tonnage. The fuel used in the producers and the values of residuals are taken at Belfast figures.

Saleable Products per Ton of Coal.	Average Selling Price.	Belfast Results—33 P.Ct. Scotch, 67 P.Ct. Cumberland.	High-Quality Coal.
Gas, therms . .	..	76	103·8
Coke, cwt. . . .	27s. 1d. per ton	10·247	10·24
Tar, galls. . . .	7·03d. per gall.	15·095	12·4
Liquor, galls. . .	0·3745d. per 10 oz. gall.	43·67 at 7·5 oz.	42·3 at 5·9 oz.

Cost of Gas per Therm. Pence.

—	Belfast.	High-Quality Coal.
Coal	3·66	3·20
Labour, fuel, &c.	1·54	1·13
Gross cost per therm	5·20	4·33
Residuals	3·75	2·53
Net cost per therm	1·45	1·80

With the higher quality coal, the decrease in coal and working costs amounts to 0·87d. per therm, but the return for residuals is lower by 1·22d., so that there is a balance of 0·35d. per therm in favour of the lower priced coal. It is not intended to suggest that this difference would hold good in any circumstances. The initial cost of coal and the condition of the residuals market are the controlling factors, and with variations in them the position might easily be reversed.

There is one point, however, which these figures emphasize, and that is the importance of developing the market for coke by every possible means. There is an enormous potential demand for suitable solid smokeless fuel; and if this demand can be captured by making readily available a constant supply of good-quality coke, properly graded, easily ignited, and with low ash and moisture contents, there is no doubt that a large reduction in the net cost of production of gas will follow.

In conclusion, the writer desires to express to his Chief, Mr. J. D. Smith, his thanks for the facilities given for the preparation of this paper, and for permission to include the various figures which have been given.

DUAL SYSTEM OF CHARGING FOR GAS v. ELECTRICITY.

By W. H. ROBERTS, Donaghadee Gas Company.

The more I consider the above subject, the more I am convinced that we have been asleep, and have allowed our opponents, the electricity undertakings, to make progress at our expense. We should, in my opinion, have adapted their methods of charging for electricity to gas undertakings long ago.

Electricity was introduced into Donaghadee at the end of last year, which placed me in competition with it for the first time in my experience. Being anxious to meet electricity on its own ground, I investigated their methods of making up their charges, and never could understand, if the comparative values of gas *versus* electricity periodically furnished to us through the

National Gas Council and other sources were correct, how the general public could be induced to use electricity to the extent they do.

What is Done at Belfast.

I had no further to go than Belfast to get some enlightenment. If I had extended my investigations further afield I might have found some more improved methods to choose from, but, for my purpose, was content with the methods as practised in Belfast. I was astounded to find how simple their methods of charging made it for the canvasser to induce electricity consumers to make such a wholesale use of electricity in their homes. I have improved their system to make it applicable to my own undertaking.

The Belfast Corporation Electricity Department charges 6½d. per unit on the flat rate, but it has an alternative system. On this system they charge a fixed sum per quarter, which increases in proportion to the Poor Law valuation of the property; and, on payment of this fixed sum per quarter, the tenant is supplied with all the current he or she may require at the ridiculously low rate of ¾d. per unit. At this low rate for heating it is not surprising the Electricity Department is successful in installing electric heaters, &c. What surprises me is that the Belfast Corporation, after having found this dual or rateable value system of charging for electricity so successful, did not extend the same system to the Gas Department. If they had done so, and fixed their conditions *pro rata* to their electricity charges, the price they would have to fix for gas on this scheme would be 4½d. per 1000 c.ft.

Gas at 4½d. per 1000 c.ft. would mean that occupiers of small dwelling houses who already consume the quantity of gas for cooking and heating, when qualifying for the quota system, could add one bijou burner for lighting their dwelling from dark to 11 o'clock nightly for about 1s. per annum.

It will be essential for those responsible for the management of gas undertakings to develop this dual system carefully and gradually, as we gain knowledge from experience.

After careful consideration I adopted what I at present have put into practice in Donaghadee. This has proved so successful that I anticipate in the near future being able to extend the concession under this scheme.

Method of Charging at Donaghadee.

The flat rate for gas in Donaghadee is 6s. 8d. per 1000 c.ft. I now offer to all gas consumers the following terms on my quota or rateable value system: On payment of a sum per quarter, based on the Poor Law valuation of the property supplied, all the gas consumed on the property will be charged at the rate of 3s. 4d. per 1000 c.ft. The fixed sums paid per quarter are: For houses under £5 valuation, 11s. 8d.; under £8, 15s.; under £15, 16s. 8d.; under £20, 20s. 10d.; under £25, 25s.; under £35, 29s. 2d.; and so on. Thus, it will be seen that 30,000 c.ft. of gas will have to be consumed in a house of £25 valuation before any benefit is derived from this scheme. The quarterly payments are equal to 3s. 4d. per 1000 c.ft. on 30,000 c.ft. for a house of £25 valuation, but all gas consumed over that amount will cost the consumer only 3s. 4d. per 1000 c.ft.

Those of my consumers who have adopted the scheme are exceptionally well pleased with the results, and have increased their consumption from, in some cases, 50 p.ct. up to, in other cases, 200 p.ct. over their consumption on the old rate.

As our Secretary requested me to make my paper as short as possible, I have confined myself to the general outline of the scheme only, but shall be pleased to give any further particulars that may be required. I have not the slightest doubt that this or a similar scheme, where adopted in competition with electricity, is one of the best competitive methods. I have already experienced the proof of this statement.

DISCUSSION.

Mr. J. McNicholl (Cork) said it would have been a great advantage to have had an opportunity of seeing the papers in print before discussing them. This applied specially to the first contribution, in which there was much detail. He was afraid, in the circumstances, that the discussion could not possibly come up to the standard which the papers merited. Mr. Hyslop had made a point of the vertical retort system being very much more scientific than the horizontal system, and requiring more expert supervision. The author seemed to think that this was an advantage; but it appeared to him (the speaker) to be somewhat of a disadvantage. The more simple a process could be made the better. This applied to almost everything. Unless the advantages of the more complicated system were very great indeed, he certainly thought that the simpler systems were to be commended. Mr. Hyslop, in speaking of the yields, made out quite a good case for the higher thermal yield; but there was another aspect of this question which it seemed to him was more important than the thermal yield—namely, the effect upon the coke of steaming. Steaming to any extent must affect the quality of the coke. Of course, Belfast was in a good position in this respect, for they had carburetted water gas plant. Having taken everything into account, they found that in their case the advantage lay with the higher yield; but it would not be so in every instance. He noticed that, in referring to the yield of sulphate of ammonia, Mr. Hyslop mentioned an increase from 16 to 22 lbs. per ton, which seemed to be a very low yield. At the present day, it did not matter much, because of the small return from sulphate. At the same time, however, he himself would expect a much higher yield, especially from a vertical retort installation. Mr. Hyslop went on to deal with the advantages of producers in connection with vertical retort settings, and spoke about the long period between clinkering, and so forth. He (Mr. McNicholl) contended that all these advantages could be obtained from horizontal settings. As a matter of fact, with the up-to-date step-grate furnace and adequate grate areas, no clinkering whatever was required. The figures given by Mr. Hyslop were extremely interesting; but he would like to study them carefully before commenting upon them. He did, however, want to congratulate him upon the method employed in furnishing the results of the working of his producers. It helped them to understand what happened in the producers between clinkering periods; and if for nothing else, the Association was indebted to Mr. Hyslop for putting this matter so clearly before them. ["Hear, hear."]

High and Low Quality Coals.

He now came to the latter portion of the paper, in which Mr. Hyslop dealt with the yield from high and low quality coals. The conclusion to which the author had come—that it was advisable to purchase second or third quality coals, rather than those of a very high quality—was the opinion arrived at many years ago in Lancashire by a noted engineer, who, as a matter of fact, did not even buy the second quality coals, but second quality slacks, and from these made the cheapest gas in the world. To his own mind, there was not a shadow of doubt that, if there was very much difference in the price between first and second quality coals, it would always pay them in the gas industry to buy the second quality. The chief disadvantage of the second quality coal was the effect upon the quality of the coke; but the word "quality" was very often used not to describe the actual intrinsic amount of coal substance in the coal, but the physical condition of the coal. Frequently there was a difference of 4s. or 5s. between screened and unscreened coal; and in this event, for gas-works use, there was no doubt the advantage would always lie with the unscreened coal. Of course, there was a limit to this, and very poor quality coals were taboo entirely from the point of view of gas making. They could produce good gas from such coals, but they could not obtain good coke. He congratulated Mr. Hyslop upon his excellent paper, and upon the manner in which he had put it before the members.

Gas Undertakings and Their Limitations.

Passing next to Mr. Roberts's paper, Mr. McNicholl said that this was a delightful little contribution which should provoke an excellent discussion, for every member present could easily find something to say upon the subject. The author had, however, omitted to mention the statutory restrictions to which gas undertakings were subjected. It was doubtful whether the gas industry would reap the same benefit from the removal of these restrictions that the electricity industry had secured from their absence in their own case. It was certainly very unfair that gas undertakings should have all these restrictions imposed upon them, and that the younger industry should have practically none; but if they were removed to-morrow, it was extremely doubtful whether gas undertakings could adopt differential charges to the same extent as electricity undertakings. The latter had to produce their commodity and deliver it in a "hand-to-mouth" sort of fashion. They had no means of storage, and this justified them in giving excessively low rates to consumers offering good load factors. Gas undertakings would not be justified in giving quite such low rates proportionately; but, at the same time, they would certainly be justified in offering very much more favourable terms to large consumers than they were doing at present. He was, therefore, in full agreement with Mr. Roberts that they ought to exploit as far as possible this side of the economics of the sale of gas. It seemed to him to be hardly fair to say that the gas industry had been altogether asleep in this matter. The majority of up-to-date undertakings, at any rate, had, as far as they were able, introduced differential charges and favourable terms for what was regarded as "good business"—that was, good loads of large consumptions. That they had not gone farther was because they had not been able to do so, consequent upon their statutory restrictions. Mr. Roberts had inaugurated a very good scheme at Donaghadee. It certainly possessed a merit of simplicity. There again, when they did go in as an industry for two and three part systems of charging, by all means let them get something as simple as possible, so as to avoid the introduction of further complications to puzzle the gas consumer. Some of the systems that were in vogue in America—the home of two and three part charges—were extremely complicated; and he hoped when this question, which was at present receiving the very close attention of the National Gas Council, came to be finally decided, it would be found possible to evolve a system which would help them to meet competition in any form, and which would at the same time possess the merit of simplicity.

A Believer in Verticals.

Mr. H. W. Saville (Wexford) said he thought it was altogether wrong to assume that the system of vertical retorts was more complicated and more difficult to handle than the horizontal retort system. He himself did not see why, because it was more scientific, it should be more difficult to handle. In the case of the vertical retort, one made use of gravity, and to this extent it was the more simple system. He was himself entirely dependent upon vertical retorts, and would be very sorry indeed to go to a place where the carbonizing was done in horizontals. One thing which interested him particularly was the question of coke. Most of them in that part of the world who were using verticals were steaming to a more or less extent—many of them more. He did not know what might have been the experience of the rest of the members, but he could not produce enough coke to keep his own neighbourhood going, with the result that there was a considerable quantity being imported. He found he could sell all he had at about 10s. per ton more than the imported coke, which seemed rather extraordinary, after all the

hard things that had been said about vertical retort coke. When he had his coke to supply, the other people could not sell any. Again, the yield of tar was 50 p.ct. more; and with the market for tar much better than it had been for many years, this was a great factor. In his own case, they could easily produce at least 33 p.ct. of the cost of the coal, which was a very big item. He would be very sorry to see the tar market leaving them. With regard to clinkering, he would like to say that he had not cleaned out a furnace for the last two years. So far as simplicity was concerned, everything worked entirely automatically. The most important thing was to get an ideal coal, and then to keep to it when one had found it. When such a coal was secured, the dampers could be set, and the whole thing left to itself.

The Smaller Consumers.

Referring to Mr. Roberts's paper, Mr. Saville agreed that it was one which appealed to all of them. Of course, there was the difficulty of the restrictions, which they were all up against; but he thought that within these restrictions even there were certain things which they could do, not only in connection with the price to large consumers. The large consumer was not so easily bamboozled by talking points, because it was often his living that was at stake, but the smaller consumer was easily talked over, and it was that class of consumer they had to deal with in the manner suggested by Mr. Roberts. Most of the members, he thought, had a good margin left within their price, which would enable them to do something to meet these points. He had been considering the matter himself, though he had not yet come down to figures.

Replies by the Authors.

Mr. Hyslop, in the course of his reply, said there was no doubt that a vertical retort plant required rather more attention than did a horizontal retort installation; but at the same time he thought it would be generally agreed that the increased yields which could be obtained more than repaid any additional attention necessitated. There was certainly no doubt that a vertical retort plant offered more scope for increasing yields as a result of skilled attention than was the case with a horizontal installation. As Mr. McNicholl had remarked, the quality of coal which they could use for gas making depended more or less upon the quality of coke which it would produce. As regarded the steaming process affecting the quality of the coke, it must be admitted that heavy steaming did to some extent result in a more friable coke; but at the same time the ash content of the large coke was not affected, so far as they could discover. Most of the ash seemed to find its way into the breeze, where it was not of so much consequence. Vertical retort coke certainly possessed the great advantage of being practically dry and of very good appearance, which went a long way towards making it sell well. In fact, it was the general experience, where both vertical retort coke and horizontal retort coke were available for sale, that the consumers would not touch the horizontal retort coke. Mr. McNicholl had suggested that the same advantages from the producer could be obtained with horizontal retorts as with vertical installations. To a certain extent this was true; but on a small plant he did not think that just the same beneficial effect could be obtained, because to put in a producer with such a large grate area meant making very substantial alterations in the design of a horizontal setting. He thought that in most cases, unless the producer was of the outside type, there was not much possibility of a sufficient grate area being allowed.

Mr. Roberts said he agreed that the gas industry had too long allowed the restrictions to which reference had been made in the discussion to be held over its head. It was only within the last year or two that they had, as an industry, approached the Government and tried to obtain some alteration in these restrictions. This was why he considered they had up to now been asleep. Non-statutory companies were able to do what he had been in a position to accomplish; and the results had been such as to prove that it was time the industry did have these restrictions removed. Just to give one instance in regard to his scheme, he might say that one of his customers, whose annual consumption had been 17,000 c.ft., and who needed to consume about 4000 c.ft. more to bring him up to the quota, went to him and said he wanted to adopt the scheme. This consumer had gone carefully into the matter, and had put in a gas fire or two and a cooker; and his first quarter's gas consumption alone amounted to 17,000 c.ft., or equal to his previous annual consumption. One could understand how easy it would be to advise a consumer to put in a gas fire at 1d. per hour under the new scheme, whereas on the flat rate it would be necessary to tell him that it would cost 2d. He considered that the gas industry had just as big an inducement to adopt some such system as had the electrical industry. To get it on a simple basis was one of the greatest difficulties he had encountered. He had introduced other systems, and had had to withdraw them; and it was only after considerable effort that he had succeeded in bringing the present method to a successful issue.

SULZER PROCESS OF DRY COKE-COOLING.

A Profitable Plant at Work.

In the course of their tour of inspection in March of this year, the Gas Manufacture Committee of the Association Technique de l'Industrie du Gaz en France visited the Victoria Mathias Mine in Essen, where there is a plant of 64 coke ovens which produce coke for the domestic market, notably for central heating. The gas is supplied to part of the town. Some 500 to 600 tons of coke are produced per day; and fairly recently the old coke quenching methods were abandoned in favour of a Sulzer plant. The report recalls that interest in the system was aroused by M. Piaton in 1921, and by M. Mougin in his valuable paper before the Association at the 1927 Congress.

The installation visited comprises a quenching chamber into which the contents of several ovens are discharged. The charge of coke remains substantially constant, as whenever hot coke is fed in at the top, an equal quantity of cooled coke is removed from the bottom. The coke is cooled by the circulation of inert gas—a mixture of nitrogen, carbon dioxide, and a very small proportion of carbon monoxide—derived from the original air content of the apparatus; the oxygen, of course, disappearing as soon as circulation is commenced. The heated gases are then drawn by a fan through a boiler.

The charging door of the quenching chamber is closed by a hydraulic seal; and discharging is effected by an extractor which makes one revolution in five minutes. The cooler is rectangular in section, and of a length equal to that of the coke ovens. Its capacity is 100 metric tons of coke, which remains therein for about four hours. The boiler is fitted with superheater and feed-water heater; the heating surface being 750 sq. in. The cost of the installation was Mk.600,000 [approx. Mk.20 to the £].

Attention is once more called to the following advantages of the dry-cooling system: Improvement in coke quality, in that it is quite dry, is mechanically stronger, is not broken up, and is completely free from dust; elimination of clouds of steam during quenching, which are so bad from the point of view of corroding any metal work near and of causing inconvenience to the public; longer life for the coke transporters; and better working conditions for the staff. In addition, the makers of the apparatus claim that the dry coke from their plants is particularly suitable for blast furnaces, and that there is no deterioration in frosty weather. Some people, on the other hand, maintain that dry-cooled coke is dustier in use, which would be a somewhat serious inconvenience from the domestic consumer's point of view.

Results and Costs.

Coke is charged to the cooler at a temperature of about 1000° C., and leaves at about 250° C. The plant provides for a daily output of some 200 tonnes of steam at a pressure of 16 kg. superheated to 300° C.—that is to say, 300 to 500 kg. of steam per tonne of coke. The steam in this case is to be used in the central generating station of the pit, which is situated alongside the coking plant.

The daily cost of running the plant amounts to Mk.200, against which must be set the following credits:

	Marks.
Value of the steam (Mk.2·50 per tonne)	500
Cost of running old wet plant	25
Extra value of 7-8 tonnes of large coke	100
Economy in transport of dry material	25
	650

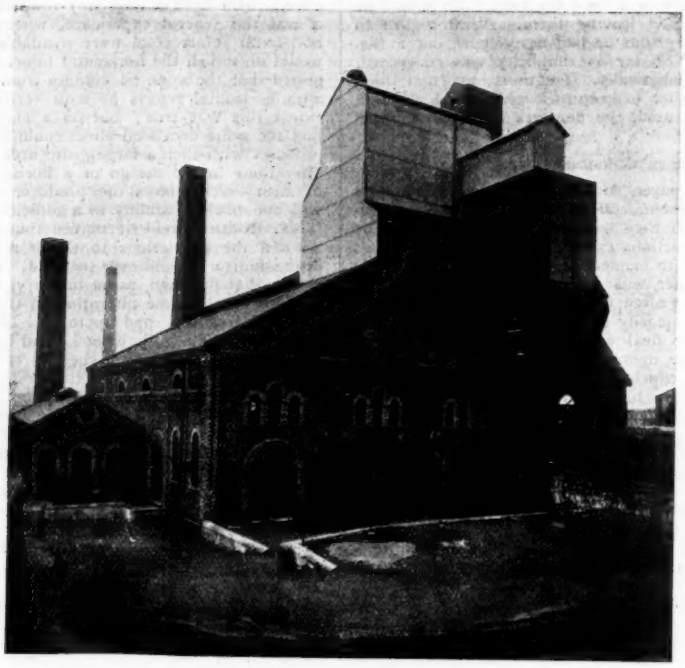
Thus there is a gain of Mk.450 per diem, or Mk.160,000 per annum. Amortizing the capital outlay (Mk.600,000) over 10 years at 9 p.ct., represents Mk.93,500 per annum. Thus the profit is something over Mk.60,000 per annum.

Safety Control of Generator Charges.

A safety control for the fuel charging machines used on water gas generators has been developed by the Semet-Solvay Engineering Corporation; the object being to prevent leakage of gas during charging. The charging machine has two outlets through which gas may escape—the magazine opening, where fuel is received, and the lower opening, where it is emptied into the generator. This safety control regulates the charging process in such a manner that one of these openings is always tightly closed before the other is opened. If for any reason either opening cannot be closed, the control gives a warning signal by means of a light, and the charging machine stops work until the cause of the stoppage is removed. This increase of the safety factor adds still another important advantage to automatic charging. The charging machine increases the gas making capacity by enabling the operator to maintain a uniform bed of fuel, by saving the time previously lost in manual charging, and by making possible temperature uniformity in the generator. The safety control has been adopted as standard equipment on Steere charging machines.

VERTICAL RETORT INSTALLATION AT BARRHEAD.

[Reprinted from "West's Gas."]



Barrhead lies about seven miles south of Glasgow, and three miles west of Paisley. It has a population of between twelve and thirteen thousand, the chief industries being engineering and calico printing, and is the home of the world-famous Shanks' porcelain ware.

The gas-works are situated in the centre of the town; and on passing through the main thoroughfare an excellent view is obtained of the Glover-West installation, which is placed inside the horizontal retort house.

The bench, capable of a total daily gas output of 750,000 c.ft., comprises eight 40-in. Glover-West "steaming type" retorts, each 25 ft. long, in units of two, built with silica material, and is carried on a reinforced concrete floor supported by four massive ferro-concrete piers.

The vertical retort house floor was constructed at the horizontal retort stage level for the efficient handling of the coal to the installation; an arrangement which received exhaustive consideration by the Company's Engineer before the work was proceeded with.

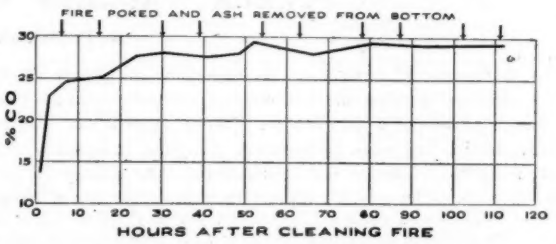
Advantage was taken of the existing lay-out of the horizontal retort house, with its overhead railway gantry and regenerator furnace subway. It was decided to excavate, and form in reinforced concrete a tunnel at the furnace subway level. The coal can be dropped from wagons on the overhead gantry on the retort house stage floor, suitable holes being arranged in the roof of the proposed tunnel at convenient positions with swivel doors attached to the under side. Light rails are provided in the subway and side-tipping bogies so that the coal can be fed into them. From any of the points the bogie can be wheeled on to a weighbridge into an electric retort hoist and transported up to the top of the vertical retort house, where it is tipped into the coal bunkers. This scheme has proved a highly satisfactory one. Provision is also made for the inclusion of a West lip-bucket conveyor at some future date.

A 30-cwt. electric hoist, giving access to the tunnel and all platform stages, deals with both coal and coke. The coal is handled in the previously mentioned manner by side-tipping bogies, each with a capacity of 12 cwts. By this means one man can weigh, hoist, and tip nine tons of coal per hour into the overhead storage bunkers.

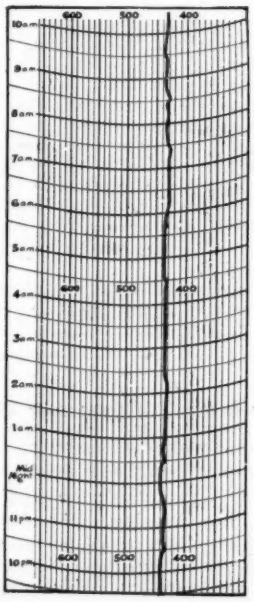
A 25 H.P. electric capstan, placed on the railway gantry, deals with all coal and coke in and out of the works' siding. It is interesting to note that the total cost for electric current used by the electric capstan and hoist, which handle all coal and coke to and from the plant, for three months ending March 31 was only £10 0s. 11d. This figure also included part lighting of the installation by electricity.

Coke is discharged from the retorts into bottom-door bogies, and hoisted either to the producer or tipped into a 50-ton coke hopper arranged above the railway gantry and fitted with a series of shoots and screens to deliver coke to wagons, carts, or producer.

A weighbridge is fixed on the producer platform so that the weights of fuel to producer can be accurately determined. Over a period of six months the fuel consumption was 16·6 p.c., and in winter months, when four retorts are working up to their capacity, this figure is reduced to 15 p.c. with unscreened coke.



The graph reproduced above shows the CO content of the producer gas taken over a period of 112 hours immediately after a thorough disturbance of the fire by poking the step grate from the top to bottom. The arrows denote the times at which the fire was poked and ash removed from the bottom of the producer. This poking was confined to the three bottom steps of the grate, and these are merely sufficient to ensure no



building-up of clinker. A slight blow of steam is admitted to the bottom of the fire at each side. The producer-cleaning programme is to disturb the fire by poking the step grate from top to bottom only twice a week and to poke the bottom three steps once per shift.

The following are the carbonizing results for six months ending Feb. 29, 1928:

Make per ton of coal	18,109 c.ft.
Average calorific value	436 B.Th.U.
Therms per ton	78·9
Coke sold per ton, after deducting coke to producer and boiler fuel	5·5 cwts.
Tar per ton of coal	20 galls.

The vertical installation was started up last year on Aug. 11 at 10 a.m., and by 4 p.m. on the same day gas making in the old plant was abandoned. Since then the entire load has been sustained by three of four of the new retorts. A "Sigma" instrument records the calorific value on the "make," which is corrected by "Boys" calorimeter three times a day. The cutting of the chart reproduced, a representative example of daily practice, will illustrate the almost perfect line which is maintained when operating as low as three retorts under ordinary working conditions. The output of the Barrhead Gas Company this year will be approximately 74 million c.ft., of which 16 p.ct. comprises industrial load, 42 p.ct. ordinary domestic, and 42 p.ct. prepayment domestic.

CENTRAL HEATING BY GAS.

How it is being Popularized in France.

[Our readers will find interest in an energetic central heating campaign, which was supported by the Technical Heating Bureau of the French Gas Association. The extracts are from a paper by M. Damesne at the Annual Congress.]

At present the average daily load of a great number of gas undertakings is substantially greater in summer than in winter, and a desideratum which should always be kept in view is the levelling-up of the curve. Central heating through the medium of a gas boiler is one of the first things to suggest itself. The time to discuss the possibilities of central heating by gas has passed, for there are many installations which have the hall-mark of efficiency and suitability; and these actual examples have been backed up by a mass of evidence in the form of papers before the Association Technique, and carefully prepared bulletins published by the Office Technique de Chauffage. We are then on firm ground for striking off, but the question is how to get the system widely taken up by the public, so that they themselves may become our best publicity agents. It is with this aspect that the present paper largely deals.

It is a recognized fact that it is easier to get gas installed in new buildings than in old; and so our first care is the architects, who are interested by call and through the medium of our literature. Everywhere we have a good reception, and gas heating apparently attracts their attention; but when the suggestion is made to pass from theory to practice, we find a certain reluctance. Unless one can furnish him with definite local examples, the architect is inclined to be on the defensive. It is easy enough to meet any argument which may be brought forward as to the "dangers" and difficulties of gas, but it is a vastly more delicate process to produce even approximate figures of consumption, and the architect is perfectly right in shrinking from letting his client into a speculation. The best way is, right at the outset, to get a gas boiler into the architect's house itself, providing the central heating system already installed is adaptable.

The same steps are taken in the case of contractors for central heating installations, who are always kept posted with suitable literature. Usually, the trader is more difficult to convince than the architect, for he feels that he has even more direct responsibility in his recommendations. Again, it must be recognized that the first cost of a gas installation is more than that of a coal boiler—the boiler itself costs more, and there is the question of a special service pipe, flue, &c. Further, a contractor often feels that if his client is only lukewarm for gas, his contract may be snatched from him at the last moment by another man's lower estimate for a solid-fuel boiler. After this earlier spade work, we start a small publicity campaign, the principal phases of which are as follows: (1) A direct visit to certain of the landlords who are known to be favourably disposed. (2) Circularization of a number of people selected from among traders, telephone subscribers, and householders who already have a central heating installation. (3) An outside publicity campaign of bill posting, supported by a series of advertisements in the local Press. The well-known slogan "*Une allumette et c'est tout*" is kept prominently in the public eye in these advertisements, and on the screens and programmes of cinemas, theatres, &c. As an example of the result of this publicity, which is varied in intensity according to the time of the year, but never interrupted completely, it may be stated that in a town of 20,000 inhabitants the number of installations increased from five in the winter of 1926-27 to twenty-three in the winter of 1927-28.

At first, it was clear that contractors were not prepared to take an interest in gas; in fact, their antipathy was so marked that we began to think of taking up installation work ourselves. We could have worked to so small a margin of profit as to bring down the first cost practically to that of a solid-fuel boiler. But we realized that it would be far better to have the contractors our allies; and accordingly we put forward the suggestion that they themselves should cut down their profit on gas work and accept from us a bonus on each installation. The bonus varies according to the size of plant, and is payable as to half on completion and half when the consumption of gas reaches a certain level. Thus the contractors became our valuable allies; and they were happy to be when they found that, as gas heating spread, people were inclined to come to us first. Our friends are impressed, too, with the information so carefully compiled by the O.T.C., and with the trouble taken by the latter's representatives whenever a problem of unusual difficulty presents itself.

Most important of all is, of course, the satisfying of our consumers; and in this regard we give a small discount according to consumption and a reduced basic rate varying with the size of an installation. We also fit service pipes free, and in special cases are prepared to defray part of the installation cost. One thing to remember is that it is extremely dangerous to attempt to make even an approximate estimate of a client's future consumption. However much care may be taken in arriving at a likely figure, and in spite of the precision of regulation which is possible with gas, it is the individual human factor which will determine the result; and it is far better not to hazard a guess and risk the consumer's disappointment. Great stress is laid upon the importance of inspection and maintenance of installations; and it is considered that the boilers themselves should be cleaned out once a year at least, twice if they are heavily loaded. Finally, if central heating by gas is to develop, and eventually take the place of the majority of solid fuel fired installations, it is essential to put into practice a suitable tariff, and to keep the same continually adjusted to meet variations in the cost of anthracite.

Second International Conference on Bituminous Coal.

Twelve topics for discussion at the Second International Conference on Bituminous Coal, to be held under the auspices of the Carnegie Institute of Technology, Pittsburgh, Pa., from Nov. 19 to 24, are tentatively announced by Dr. Thomas S. Baker, President of the Institution and Chairman of the Congress. About one hundred engineers and scientists representing fifteen nations have already accepted invitations to speak at, or to send papers to, the Congress. About 60 p.ct. of the papers will be delivered by representatives of countries other than the United States. Though the Second International Conference will be similar in purpose to the first Congress held in 1926, preliminary plans for this year's meeting show that its scope will be considerably enlarged, and the programme will be more international in character. The liquefaction of coal, which was one of the principal subjects of discussion at the first meeting, will again occupy a prominent place in the deliberations. Low-temperature distillation will be treated by representatives of at least half-a-dozen countries. High-temperature distillation, power from coal, coal tars and oils, complete gasification of coal, origin of coal, coal washing, pulverized coal, catalysts, and the general aspects of the bituminous coal industry are other topics that will be considered. With regard to British contributors, the economics of the coal industry will be discussed by Lord Melchett. Low-temperature distillation will be treated by Dr. C. H. Lander, Mr. Harald Nielsen, and Dr. E. W. Smith, and high-temperature distillation will be considered by Mr. Edgar C. Evans.

Society of British Gas Industries.—The autumn general meeting of the Society will be held on Thursday, Nov. 22, at the Hotel Cecil, Strand, W.C., under the Presidency of the Marquess of Hartington, M.P.

INDIA'S COAL PROBLEM AND LOW-TEMPERATURE DISTILLATION.

From an article by MURRAY STUART, D.Sc., Ph.D., F.C.S., M Inst.P.T., Assoc.M I.Min.E., late of the Geological Survey of India, and formerly Chemist in the Birmingham Corporation Gas-Works, in the August issue of "India."

Economic conditions vary greatly in different countries, but there are certain outstanding instances in the world at the present day where the introduction of the low-temperature distillation of coal would supply an obvious want and be a benefit to the community. India is one of these instances. In India, practically speaking all the domestic cooking is done on open hearths, either in the open or in kitchens or rooms which are not equipped with chimneys; and the fuel used is either charcoal, wood, or dried cow-dung. The fact that it is done on open hearths and that no provision is made for dealing with smoke precludes the use of raw coal as a fuel. Charcoal is expensive; and if a satisfactory smokeless fuel, such as can be produced by the low-temperature distillation of coal, were available in India at a price well below that charged for charcoal, it is obvious that the demand for it would be enormous.

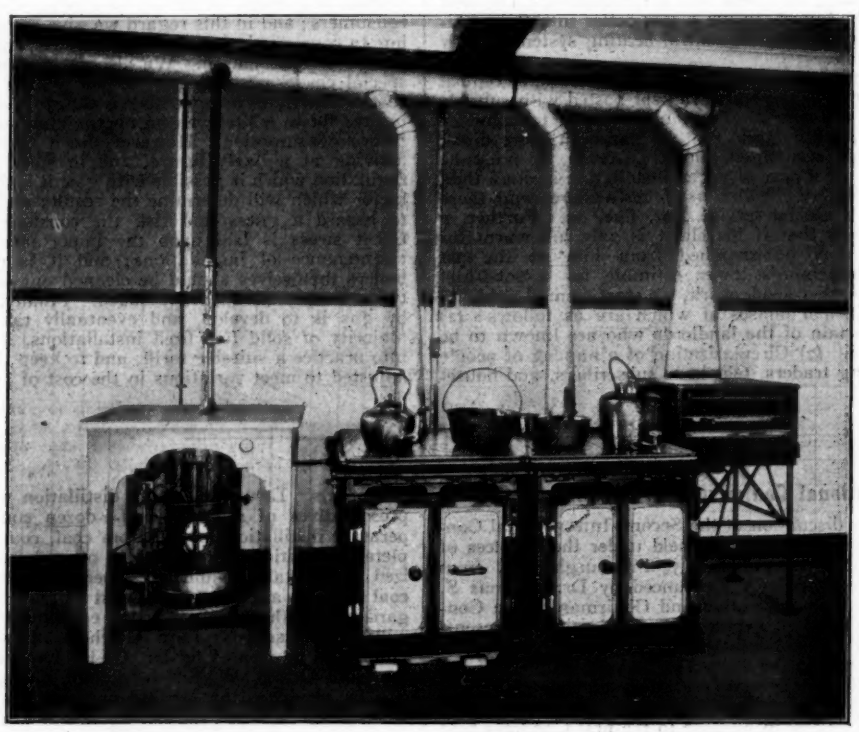
The coal industry of India is in a most unsatisfactory condition, and the outlook at the present moment is most depressing. As things stand at present, the owners of second and third grade coal are faced with financial disaster in the ordinary market, and for some years have only been able to extract a meagre livelihood from their mines. Many of them may even have to close down unless a new market is found for their coal. Now the second grade coals of the Ranegunge and Jharia coalfields, of the non-coking or semi-coking variety are eminently suitable for producing a highly satisfactory smokeless fuel for India's needs if treated by low-temperature distillation. India has therefore both the need for the smokeless fuel and the material going begging from which to produce it. The second grade coal is crying for a new market, and the demand for a satisfactory smokeless fuel is increasing by leaps and bounds.

Another aspect of the need for such a process is stressed in the recently issued report of the Royal Commission on Agriculture in India. It is pointed out that it is highly important that a satisfactory fuel should be found as a substitute for dried cow-dung, so that the cow-dung may be available as a natural manure for the land.

From the point of view of opposition to the low-temperature carbonization industry from powerful vested interests, India would appear to be in a very favourable position. The oil obtained in the process should not compete in any way with the indigenous-oil industry, since the petroleum oil produced in the Indian Empire is not sufficient to supply India's demands, and some additional sixty-five to seventy million gallons of foreign kerosene are imported every year. The low-temperature coal-oil would merely compete with this foreign imported oil, therefore; and, unless the indigenous-oil companies were influenced by their relationships with other oil companies outside the Indian Empire, they should welcome the low-temperature coal-oil, and take it over to refine, distribute, and sell through their own organization. How far they would be influenced by their relationships with other oil companies outside the Indian Empire it is impossible to say, for it is obvious, of course, that the introduction of the industry into Great Britain on a large scale would be a very serious blow to the companies at present importing oil into Britain; and if the industry began to flourish in India it would naturally attract the attention of people in Britain. The petroleum industry is alive to the menace to comfortable markets threatened by low-temperature distillation, and at present is favourably situated to deal with the threat. It must be borne in mind, therefore, that the strongest opposition to the introduction of the industry may have to be encountered, not because of Indian conditions, but because of the whole question generally, and particularly as it affects Britain. This is an aspect of the case which does not seem to have been considered by either the Indian or the British Governments.

If the worst comes to the worst, however, and the indigenous-oil industry will have nothing to do with low-temperature coal-oil, it should not be difficult to dispose of it. One fraction could be refined especially from the point of view of batching oil for the jute industry, and so supply a market untouched by the indigenous-petroleum industry. Disinfectants would also find a ready market. It is unlikely, however, that any such active opposition will occur. The most likely thing to happen is that a coal group or petroleum group will obtain the Indian rights of a process, and then merely use it themselves, and keep it away from everyone else in the country. This will be very good for the coal or petroleum group and very bad for the rest of India. It is to be hoped that process owners will realize this danger and guard carefully against it.

GAS EQUIPMENT IN A FAMOUS HOSTELRY.



The famous Coach and Horses Hotel at Moreton, Cheshire, has recently installed new kitchen equipment supplied by Messrs John Wright & Co. (Radiation, Ltd., Proprietors). The cooker, as shown in the photograph, is a double 5442 "Bordo," with solid top; the right-hand oven being arranged as a hot-closet. The top is fitted with four double concentric burners with lids over. A griller stands beside the cooker.

COPPÉE COKE OVENS FOR NEW SOUTH WALES.

Details of the £1,000,000 Scheme.

Brief mention was made in last week's "JOURNAL" of the fact that a contract for the construction of coke ovens and bye-product plant, at a cost of about £1,000,000, had been placed with the Coppée Company (Great Britain), Ltd., by the Broken Hill Proprietary Company, Ltd., of Newcastle, N.S.W.

We learn that the installation will consist of 106 silica ovens, in two batteries of 53 each, having a minimum throughput of 2230 tons of coal per day. The coal handling plant is to include an unloading station, breakers, mixers, crushers, and large reinforced concrete storage bunkers. The distance between the unloading station and the oven bunkers is 1000 ft. There is also to be a coke handling plant capable of dealing with 130 tons per hour. The coke will be carried by belt conveyors to a specially designed coke screening and loading station, situated 1000 ft. from the discharging wharf. The bye-product plant will be for the recovery of tar and benzole and the making of sulphate and concentrated liquor.

Sea water will be used for the condensation of the gas; and special apparatus will be used for this purpose. Gas meters, boosters, and holder will be provided for the surplus gas, which will be available for use by the Broken Hill Proprietary Company. The whole plant will be built on about 4500 piles, to be driven to a depth of about 25 ft.

SAND BLASTING MAINS IN SITU.

In a note to the "American Gas Journal" on the subject of re-conditioning gas mains—which it is now general practice in the United States to undertake in connection with street improvements, so as to obviate the necessity of breaking-open the roadway later on—Mr. F. H. Williams explains the old plan of removing the pipes to store for cleaning, and states that, with the idea of securing greater economy, methods of wrapping *in situ* were developed successfully; but difficulty was experienced in finding a cheap and efficient means of cleaning.

Ultimately the Los Angeles Gas and Electric Corporation were faced with a case in which the pipe had screwed coupling joints, which were badly corroded and leaking; and it was desired to weld them. However, wire brushing did not clean the surface sufficiently to enable the metals to fuse, and a sand blast was resorted to with great success. The surface left after sand blasting is not only clean, but is also roughened, which causes subsequent applications of primers and asphalts to adhere tightly. More than all this, the pitting can be thoroughly cleaned out, and carefully inspected. Pits which have penetrated to a degree thought dangerous are built up by oxy-acetylene welding.

The cost of cleaning by the sand blast method is much lower than that of any other means tried to date; and the equipment is easily portable.

REGISTER OF PATENTS.

Burners for Lighting.—No. 294,708.

FRY, A. E., of North Finchley, N. 12, and LIGHTING TRADES, LTD., of Wandsworth, S.W. 18.

No. 11,824; May 3, 1927.

The object of this invention is to provide an improved form of the preheating or mixing chamber for gas burners, designed to overcome backfiring and to dispense with the heretofore proposed remedies.

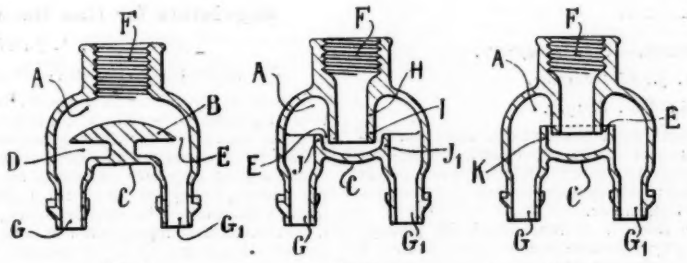


Fig. 1. Fig. 2. Fig. 3.

NEW SUPERHEATER BURNER.—LIGHTING TRADES, LTD.

The construction according to the present invention comprises a one-piece preheating or superheating chamber of clay or the like supplying all the nozzles and so constructed that the interior is divided into two parts, the one communicating with the other through a more or less restricted passage and so arranged that the two divisions are necessarily traversed by the mixed gases passing to the nozzles. The second chamber forms a reservoir in which a stable mixture of gas and air is produced for the service of the nozzles.

Figs. 1, 2, and 3 show forms of the invention. Referring to fig. 1 in this form, the preheating chamber A is horizontally sub-divided by means of plate B of mushroom shape in cross-section, which is supported from the underside C of the chamber A; and the part D of the chamber A below the plate B performs the superheating function to a greater extent than the remaining part of A. The periphery of plate B extends to within a short distance of the wall of the chamber A, thus forming a restricted passage E so that the mixture of air and gas entering the preheating chamber A through the inlet F can only reach the nozzles G, G_1, by passing through the restricted and baffled passage E. This stops back-pressure on the bunsen, thus improving the action of the latter and producing a better stabilization of the flame under variations of pressure and gas service.

Referring to fig. 2, in this form the preheating chamber A is vertically subdivided. For this purpose the chamber is formed in one with an elongated bunsen tube H in the inlet F, and the end I of the bunsen tube extends downwards to within a short distance of the underside C of the chamber A, so that the mixture of air and gas entering at F can only reach the nozzles by passing through the restricted passage E, formed in this case between the end I of the tube H and the walls J, J_1 of the nozzles G, G_1, extending into the chamber.

In fig. 3 an example of the invention is shown in which a cup K is formed in the base of the chamber between the end I of the bunsen tube H and the wall of the chamber A, so that in this form the communication from the interior of the tube H to the nozzles G, G_1 passes through the restricted passage E formed between the end I of the tube and the upstanding wall of the cup K.

The burner is made of magnesia or other clay. This clay construction avoids the corrosion which usually takes place in metal parts under the action of heat, and is therefore cleaner in use; also with the clay construction less diffused heat is given off, and the heat is concentrated on the mixed gases instead of being dissipated.

It is to be understood that the invention is applicable to gas burners having any greater number of ignition nozzles.

Breaking Coke.—No. 294,798.

PERTWEE, H. A., and BACK, W. H., both of Great Yarmouth.

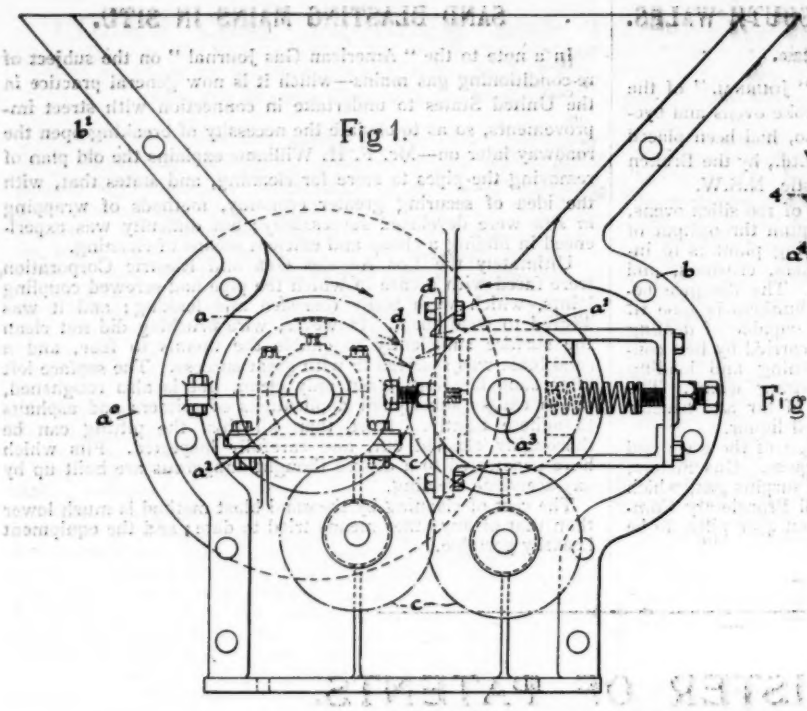
No. 25,406; Sept. 26, 1927. No. 5185; Feb. 18, 1928.

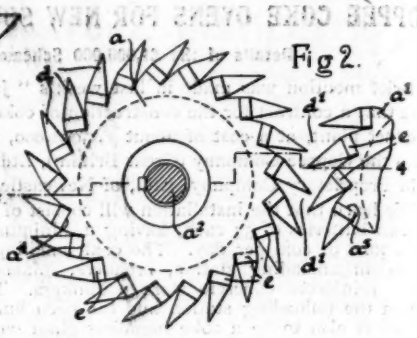
This invention relates to improvements in machines for breaking coke by power, of the type in which a pair of rotary cutters on parallel oppositely rotating shafts are provided; each cutter comprising a series of discs or a roller studded with pointed arms or fingers. Hitherto such arms have been either screwed into, keyed, or otherwise separately attached to the rollers, or else have been formed integrally therewith; and the object of the present invention is to provide means whereby the arms may be secured to the rollers more advantageously.

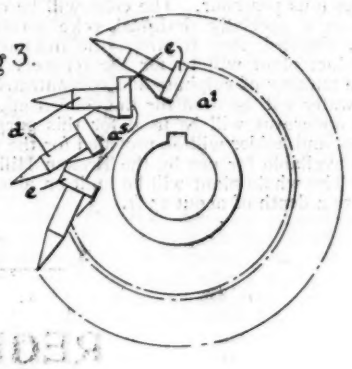
According to the invention, the pricker arms are mounted on, or made solid with, bars which are detachably secured to the rollers.

Fig. 1 is an elevation of the patentees' machine; and figs. 2 and 3 are elevations of two forms of pricker rollers which are the main features thereof.

a, a^1 are the two pricker rollers which are housed in a casing *b*; the upper portion of which forms a hopper b^1 for the reception of the coke to be pricked. These rollers *a*, a^1 are mounted on horizontal shafts or axles a^2, a^2, and are rotated in opposite directions, as indicated by arrows in fig. 1, the roller *a* being driven by the pulley a^3 while the roller a^1 is driven from the roller *a* by gearing *c*. *d*, *d* are the pointed pricker arms which in fig. 2 are cast solid with the bars *e*, *e*. These bars *e*, *e* are detachably secured (say,







COKE BREAKER.—MESSRS. PERTWEE AND BACK.

by screws) to faces of plates a^4, a^5 of the rollers a, a^1. The plates are so formed that the arms or prickers d, d project tangentially from the circumference of the rollers. The pointed ends of the pricker arms d, d are preferably chilled or otherwise hardened. The rollers are so arranged in the casing b with respect to one another that when rotated in opposite directions the prickers of each roller "mock" those of the other roller.

In the modification shown in fig. 3 the pricker arms d, d, instead of being formed integral with the bars e, e, are made separate therefrom and riveted thereto, but they may be secured in any other suitable manner.

Lighting Burners.—No. 294,827.

FALKNER, A. J., of Dunmow.

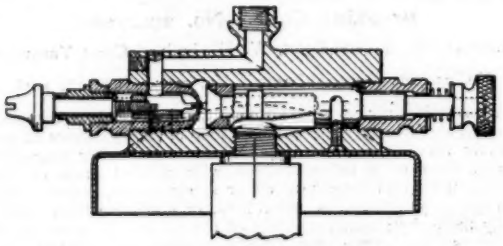
No. 33,006; Dec. 6, 1927.

This invention relates to incandescent gas burners, more particularly of the kind having a gas inlet in the upper part and leading to a horizontal passage or conduit into which air is admitted and in which the gas and air are mixed; this passage having at one end a gas injector and an outlet on its underside.

In the proposed construction there is at the end of the passage remote from the injector a partly rotatable hollow plug, having a lateral opening for the gas and air in communication with the outlet. This opening can, by turning the plug, be adjusted relatively to the outlet, for the plug has a side recess which is employed or not to such degree as may be required according to the quality of the gas.

As one end of the horizontal passage has the gas injector and the other end has the regulator, both these parts are outside the main heat zone, so that they can be regulated by hand while the burner is alight.

The gas inlet and the horizontal passage are formed in a single



Falkner's Lighting Burner.

body part. The gas passes downwardly from the inlet into the injector, from which it emerges through a needle valve. This needle valve or equivalent directs the gas into the open end of the regulator, from which it passes sidewardly to the outlet. The regulator extends outside the end of the body, where it is capable of limited turning movement by hand; limitation being effected, say, by a screw passed through the body part and engaging in a groove in the outer face of the plug. The gas preferably enters the plug through a flared or tapered passage therein, and then proceeds along a straight bore and through the lateral opening, which may be made in the plug by cutting a flat on one side until the bore is reached, the cutting being preferably inclined so that the opening is of tapered form.

Air inlets are arranged in the body part adjacent to the end of the injector. In use, the gas is controlled in usual manner by the injector; and for rich gas the opening in the plug is set about opposite the side of the body in which the outlet is made, while for gas of poorer quality the plug is turned to bring the opening more to one side, with the result that the gas passes along, or partly along, the recess and a better mixing of the air and gas is effected.

The general design of the burner will be clearly understood from the section reproduced.

Regulators for Gas Burners.—No. 294,828.

FALKNER, A. J., of Dunmow.

No. 33,008; Dec. 6, 1927. No. 34,372; Dec. 19, 1927.

This invention relates to a control device which the patentee claims to be applicable to practically all burners of the bunsen type, whether used for heating or for lighting purposes.

The device comprises a housing of substantially tubular form within which a plug angularly adjustable by an external head is arranged; the housing being provided with a gas inlet and an air inlet and a mixing chamber. The plug is hollow, and part of the hollow forms a portion of the mixing chamber and part forms the duct of an injector; the plug also being provided with a gas opening entering the duct and an air opening entering the chamber portion. The gas and air openings are simultaneously adjusted by turning the plug, with the characteristic feature that an annular gas passage and an annular air passage are arranged between the hollow plug and the housing so as to maintain communication between the inlets and their corresponding openings irrespective of the angular adjustment of the plug in the housing. Part of the mixing chamber is formed by a hollow part of the plug, and the remainder may be formed by an extension of the housing; and this chamber is open to the burner proper. The injector may be made adjustable exteriorly by extending it beyond the outer end of the plug and providing it with a suitable head. A constriction may be provided in, or at the end of, the mixing chamber to assist its function.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 15.]

Nos. 22,708—23,239.

BAKER, R. S.—"Gas engines." No. 22,762.
BUEHL, H.—"Gas igniters." No. 23,066.
CROOKSTON, S.—"Sealing trough for waterless gasholders." No. 23,187.
GIRTEN, J.—"Safety device for gas burners." No. 22,759.
JUNGMANN, L.—See Buehl, H. No. 23,066.

Continuous Coal Carbonization.—In a circular to the shareholders, the Directors of Continuous Coal Carbonization, Ltd., state that the first unit of a 1000 ton per day plant to be erected is now nearing completion, and should be in production early in September. The works are situated at Erith, Kent, about 14 miles from the City of London. The Company have secured a site of approximately five acres. In addition to the main commercial plant, demonstration, experimental, and testing plants are being constructed.

MISCELLANEOUS NEWS.

BROTHERTON & CO., LTD.

Fiftieth Anniversary of Foundation.

On Saturday next, Sept. 1, Colonel Sir Edward Allen Brotherton (who is a Freeman of both Leeds and Wakefield) celebrates the fiftieth anniversary of his founding of the firm of Brotherton & Co., Ltd.

The business was founded by Sir Edward in 1878, the first venture being an ammonia distillation works at Wakefield. The business prospered under his untiring efforts, and new works—some involving other processes—were erected in other industrial centres, until, prior to the war, the Company owned works at Wakefield, Leeds (two), Birmingham, Liverpool, Glasgow, Sunderland, Workington, and Middlesbrough, with depôts at Birkenhead, Immingham, and Sunderland. The German-built Mersey Colour and Hydrosulphite Works were added in 1917, being purchased from the Board of Trade.

During the war, the Company's resources were fully employed in the production of munitions. Additional ammonia works were erected, and plants for the production of "T.N.T.," picric acid, and oleum installed. Sir Edward gave £5000 to the Prince of Wales's Fund, raised and equipped the Leeds "Pals'" Battalion at his own expense, and returned to the National Exchequer all interest on his war loan of £500,000. For these beneficent acts, and in recognition of his long public service, he was created a baronet in 1918.

Twice in his career Sir Edward has opened banking accounts for all the school children of Wakefield. He founded and endowed the Brotherton Charity Trust to provide for necessitous men and women of Wakefield, and he founded the Chair of Bacteriology in the Leeds University. His most recent gift was one of £100,000 to Leeds University.

Sir Edward possesses one of the finest private libraries in the country.

KENT COKING PLANT.

Illingworth Low-Temperature Carbonization Installation at Snowdown Colliery.

It is stated by the "Colliery Guardian" that during recent months most interesting and important experiments in the production of smokeless fuel, motor spirit, tars, oils, and gas from Kent coal have been carried on by Messrs. Pearson & Dorman Long, Ltd., in conjunction with the Illingworth Carbonization Company, Ltd., at the low-temperature carbonization plant of the latter Company at Pontypridd, South Wales.

After most thorough and exhaustive tests with all classes of Kent coal—and especially with the small coal and fines from the Birtley dry cleaning plant—such satisfactory results have been obtained that an agreement has been entered into between the two Companies, under which Messrs. Pearson & Dorman Long have been granted an exclusive licence for the county of Kent (except such part of the county as is within a radius of 15 miles of Charing Cross) to erect and operate plants for the low-temperature carbonization of coal under the Illingworth patents. The first unit of a 400 ton per day plant is to be installed immediately; and production is expected to commence early in 1929.

The close proximity of the Kent coalfield to London offers a splendid market; and this new development of the production of a smokeless fuel, home produced motor spirit, tars, and oils on a large commercial scale is of national importance in the scientific use of our coal resources.

The well-known firm of Pearson & Dorman Long is pre-eminent in the development of the Kent coalfield. Dr. S. Roy Illingworth, D.Sc.Lond., F.I.C., A.R.C.S.Lond., M.I.Chem.E., is the Technical Director of the Illingworth Carbonization Company, and a recognized authority on low-temperature carbonization.

TRADE NOTES.

Whessoe Patent Rotary Washers.

The Whessoe Foundry and Engineering Company, Ltd., of Darlington, announce that in connection with their patent rotary washer for ammonia and naphthalene, they have in hand six machines of a total capacity of 30 million c.ft. for The Gas Light and Coke Company, two for the East Hull Gas Company, one for the Derby Gas Company, one for Weymouth, one for Quebec, and one for Ascot.

Smoke Prevention and Fuel Saving.

The device known as the "Eddystone," which has been recently introduced to the British market, and which consists of a special refractory arrangement easily applicable to the furnaces of Lancashire, and other similar boilers, has already proved its success in a number of representative installations throughout the country. These devices are fitted to boilers in steel works, textile mills, and a gasworks, as well as in other mills and factories of different types. The fuel saving and smoke prevention obtained by the use of the "Eddystone" has resulted in a number of repeat orders being placed for this simple and inexpensive fitting, which can easily be installed at the week-end by a handy man, without in any way interfering with the boiler structure.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

A thoroughly bad month for this market is drawing to an end with hardly a redeeming feature. It is generally acknowledged to have been about the worst since the general stoppage. All classes of coal have been affected by the extraordinary shortage of tonnage, so that even the better-class collieries which have a good percentage of their outputs sold under contract have been unable to keep going.

There has been very little inquiry throughout the month, and the absence of demand gives little prospect of any early improvement in the position. The one hope is that what is generally called seasonal demand will be in evidence shortly. Gas coal shipments should normally begin to show increase, and it is hoped that the coking coal market will develop more activity.

Quotations are still being maintained by the price agreements, and, as far as can be ascertained, there has been little or no cutting. Wear Special gas makes ask 15s. 3d. to 15s. 6d. f.o.b., and best qualities 14s. 9d. Seconds and others are from 13s. 6d. down to 13s. Durham coking coals ask 13s. 3d. to 13s. 6d., only a few special makes quoting 13s. 9d., and some brands being obtainable at 13s. Best unscreened steams are little better than 14s. f.o.b., and second-class bunkers are weak at 13s. to 13s. 3d. Northumberland steams are very short of trade; but the fixed minimum prices are maintained.

Gas coke for prompt shipment is easy at 19s. 6d. to 20s. f.o.b.; but up to 21s. is still asked for forward.

YORKSHIRE AND LANCASHIRE.

Gas coals in Yorkshire and Lancashire are now moving more freely owing to seasonal trade. The majority of contracts having been placed, there is little or no forward business, but there are indications that prices will appreciate in the near future.

Industrial coals are moving but slowly, the larger consuming trades not being occupied to their full extent. Prices for washed coals remain normal. Coking slacks, while not so firm, are in active demand.

The shipping market moves easy for prompt despatch. Forward business appears to have satisfied the best requirements of the Five Counties Scheme.

There has been a rather better demand for domestic coal during the past week, and with extended holidays there appears to be a better tone in this direction. Collieries in West and South Yorkshire are anticipating better business by reason of advanced figures to the extent of 1s. per ton as from Sept. 1.

MIDLANDS.

Whether the September advance of prices will be as general as the warnings of dearer coal have been only time will show. Some collieries in this district have been able to obtain rather better prices for a fortnight past for certain special qualities, which were lowered at the beginning of the summer to induce stocking and are no longer in need of the stimulus.

Consumers who have plenty of storage accommodation appear to have laid in stocks on a scale rather larger than was anticipated. To that extent the forward demand is discounted. Latterly, too, merchants have thought they could not go wrong in putting down sound stacking coals which could be obtained in the dead season at very low rates.

So far as pithead stocks are concerned, however, the position is much better than it was some months ago. Spot lots are seldom to be met with now. Though there is no more industrial coal going into consumption, and only very cautious buying of household sorts, a sounder equilibrium has been established by the restriction of output. To this extent the trade approaches the autumn season under more hopeful auguries.

The reduction in output at the cokeries no more than keeps pace with the decline in consumption at the blast-furnaces. Values are unchanged at 12s. to 13s. on rail for blast-furnace qualities. There is no symptom of stringency in any department of the fuel market.

CONTRACTS OPEN.

Condenser.

The Gas Committee of the Borough of Stourbridge invite tenders for a water-cooled condenser. [See advert. on p. 461.]

Gasholder.

The Borough of Leigh (Lancs.) Gas Department invite tenders for a three-lift spiral gasholder. [See advert. on p. 461.]

Pipes and Specials.

The Clacton-on-Sea Gas and Water Department invite tenders for cast-iron pipes and specials. [See advert. on p. 461.]

Eastbourne Gas Company's Dividend.—The Directors of the Eastbourne Gas Company have declared an interim half-yearly dividend at the rate of 8¼ p.ct. per annum on the "A" stock, and 6¼ p.ct. per annum on the "B" stock, payable on Sept. 3 next.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *Aug. 27.*

Business in tar products is quiet; but values generally continue unchanged. Current prices are as follows:

Pitch, about 50s. per ton f.o.b.
Creosote, 7¼d. to 7½d. per gallon.
Pure benzole, about 1s. 8d. per gallon.
Solvent naphtha, 95/160, 1s. 5d. to 1s. 6d. per gallon.
Pure toluole, 1s. 11d. to 2s. per gallon.
Pyridine bases, about 5s. per gallon.

Tar Products in the Provinces.

Aug. 27.

Markets for tar products remain unchanged.

The average prices of gas-works products during the week were: Gas-works tar, 35s. to 40s. Pitch—East Coast, 47s. 6d. to 50s. f.o.b. West Coast—Manchester, 41s. 6d. to 42s. 6d.; Liverpool, 43s. 6d. to 45s.; Clyde, 42s. 6d. to 45s. Toluole, naked, North, 1s. 5d. to 1s. 6d. nominal. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 1½d. to 1s. 2d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid, 6d. to 6¼d.; salty, 5⅞d. to 6¼d.; Scotland, 5⅞d. to 6¼d. Heavy oils, in bulk, North, 8¼d. to 8½d. Carbolic acid, 60 p.c., 2s. 2d. to 2s. 2½d. prompt. Naphthalene, £13 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.c., purely nominal; "B" quality, unsaleable.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.	s. d.	
Crude benzole . . .	0 10½	to 0 11	per gallon at works
Motor ,, . . .	1 4½	,, 1 5 ,,	,, ,,
90 p.c. ,, . . .	1 7	,, 1 8 ,,	,, ,,
Pure ,, . . .	1 10	,, 1 11 ,,	,, ,,

Safety First.

The attention which the question is receiving at the present time is emphasized by the fact that accident prevention is dealt with at greater length than usual in the lately issued annual report of the Chief Inspector of Factories. It has also been authoritatively stated that further factory legislation can only be avoided by intensive voluntary efforts to eliminate industrial accidents. To this end, many firms already utilize, with substantial economic advantage, the various services of the National Employers' Mutual General Insurance Association, Ltd., of 8-10, Brown's Buildings, St. Mary Axe, London, E.C. 3. For a guinea a year, the Association send regularly each month one set of four different posters illustrating common accident causes, and depicting methods of prevention. These posters are intended for display to employees for a period of one week only. By regular change and variety of appeal, interest among employees is maintained. On the Association's service lists are some of the largest and most efficiently conducted organizations in all sections of industry and in all districts. Reductions in accidents by as much as 87·5 p.ct. on a "man-hours worked" basis have been reported. Damaged machinery and material, loss of time, production, and morale, and other substantial incidental accident costs, are uninsurable, and form a gigantic annual total loss to industry. If only one case of blood poisoning is avoided, the subscription becomes a dividend-earning investment.

The Featherstone Gas Company announce a dividend for the past year of 9 p.ct. on the "A" stock and £6 6s. p.ct. on the "B" stock. This is the first dividend to be paid since the war.

Redhill Gas Company's Dividends.—The rates of dividend to be paid by the Redhill Gas Company on Sept. 1, for the half-year ended June 30, are as follows: On the cumulative preference stock, at the rate of 6 p.ct. per annum; on the preference "A" stock, at the rate of 5¼ p.ct. per annum; and on the ordinary "B" stock, at the rate of 5½ p.ct. per annum.

Chichester Gas Company.—The half-yearly meeting of the City of Chichester Gas Company was presided over by Mr. Joseph Cash, M.Inst.C.E., in the absence of the Chairman, Mr. W. A. Walker. The Directors' report for the half-year ended June 30, which was adopted, stated that the balance standing to the credit of the profit and loss account (net revenue) amounted to £6881, out of which the Directors recommended the declaration of a dividend for the half-year at the rate of 10 p.ct. per annum upon the "A" capital stock, and 7 p.ct. per annum on the "B" and "C" capital stocks, all less income-tax. This would absorb the sum of £1707.

Shrewsbury Gas Light Company.—In their report to the proprietors for the year ended June 30, the Directors state that the gross profit on revenue account amounts to £9430. After allowing for the interim dividend of 2½ p.ct. (less tax) paid in March last, and the interest on mortgages for the year, the balance of net profit available amounts to £12,015. The Directors recommend that a final dividend of 4 p.ct. (less tax), making 6½ p.ct. (less tax) for the year, be now declared. The reserve fund now stands at £13,621; and the special purposes fund amounts to £8292. There has been an increase of over 2 million c.ft. in the sale of gas during the year; but there has been a slump in the residuals market. Alterations and additions to plant are now in progress, which the Directors hope will contribute substantially to the further efficiency and prosperity of the undertaking. The price of gas has been reduced as from June 30 by 0·2d. per therm, equivalent to 1d. per 1000 c.ft. The number of cookers on hire at June 30 was 5109, together with 1907 fires. There were 3465 ordinary and 5629 prepayment meters in use. Mr. J. B. Lloyd has retired from the Chairmanship, after eleven years' service in that capacity, but has retained his seat on the Board. The Directors have elected Mr. H. J. Hearn Chairman, and Mr. R. D. Bromley Vice-Chairman.

The Lighting Committee reported to a meeting of the Llanidloes Town Council that they had received two tenders for street lighting, one from the Llanidloes Gas Company, and the other from the Electric Lighting Company. The Committee recommended that the tender of the Gas Company to light the lamps at 30s. each be accepted; and this was approved.

For nearly two hours last Friday night, Morecambe and Lancaster suffered the inconvenience of a failure of the electricity supply, caused by a misunderstanding in connection with the autumn illuminations at Morecambe, which it had been planned should be first used on the following night. It appears that someone gave instructions for the lights to be switched on; and this was done without authority from the Borough Electrical Engineer, and without notifying the power station at Lancaster. The sudden extra load put the plant out of order, as it had not then been prepared for carrying the additional power required for the illuminations.

Considerable discussion took place at a meeting of the Rugeley Urban Council as to whether the streets should be lighted by gas or electricity. The Committee reported that two tenders had been received, one for gas, and the other for electricity; and they had recommended that the contract be equally divided between the Gas Company and the Electricity Company. Mr. Forvell said that, from the figures quoted, electricity would appear to be cheaper than gas for street lighting, but some of the members of the Committee were not satisfied that it would prove so satisfactory as gas. Mr. Wood (Chairman of the Finance Committee) said he was not in favour of electricity for street lighting. Eventually the recommendation of the Committee was approved.

ELLIS, KEY & CO.
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Importers and Distributors of
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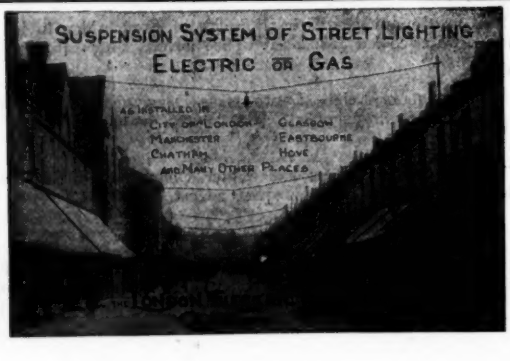

STANDARD FIRE CEMENTS
Purimachos Plastic Fire Cement (Regd.)
Drykos Dry Fire Cement (Regd.)
Unsurpassed for setting and repairing Retorts, washing the insides of Retorts to form a Glaze, and for all other purposes where strong, gas-tight joints are essential.
A free working sample of either Cement will be forwarded on application.
PURIMACHOS LTD. 34, St. PHILIP'S, BRISTOL.

STOCK MARKET REPORT.

ALTHOUGH business did not improve to any appreciable extent last week, more interest was displayed, and there were indications of a considerable improvement in the near future. Home Funds were prominent, and the speculative descriptions kept well to the fore. Gilt-edged stocks, in spite of New York money uncertainty, maintained a steady upward movement. War Loan, Conversion 3½ p.ct., and 4 p.ct. Consols all improved. Discounting the future of the well-established industrials is a popular form of amusement on the Stock Exchange, and the yields on present prices are in many cases ridiculously low. The most noticeable of these are Gramophones £3 1s. p.ct., Mond Nickels £3 5s. p.ct., and Callenders Cable £3 16s. p.ct.

Judging by the articles appearing in the daily Press this week, more attention is being drawn to the gas industry, the importance and strength of which is not generally realized by the outside investor. In consequence, improvements in the values of available stocks may be anticipated. Business was good last week.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Last Hf. Yr.	NAME.	Quotations. Aug. 24.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices.
£			%p.a	% p.a.				
171,978	Stk.	Feb. 9	5	5	Aldershot 5 p.c. max. C.	74—79	..	..
412,992	,,	,,	4	4	Do. 4 p.c. Pref.	69—72	..	..
1,551,848	,,	Apl. 12	7	7	Alliance & Dublin Ord.	94—97	..	95¼—95¾
374,000	,,	July 12	4	4	Do. 4 p.c. Deb.	68—68	..	..
523,654	,,	Mar. 8	7	7	Barnet Ord. 7 p.c.	111—114	..	..
300,000	1	Apl. 26	1/7½	1/7½	Bombay, Ltd.	22/—24/-	..	23/-
170,000	10	Mar. 8	8½	8½	Bournemouth 5 p.c.	12¼—13½	..	..
400,050	10	,,	7	7	Do. B 7 p.c.	12½—12⅝	..	12⅞—12⅝
575,000	10	,,	6	6	Do. Pref. 6 p.c.	11—11½	..	..
60,000	Stk.	July 12	3	3	Do. 3 p.c. Deb.	56—59	..	57 ..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..
357,900	,,	Mar. 8	7½	7½	Brighton & Hove 6 p.c. Con.	116—119	..	..
341,880	,,	,,	6/8/6‡	6⅔	Do. 5 p.c. Con.	103—106	..	..
1,887,500	,,	July 26	5	5	Bristol 5 p.c. max.	90¼—91¼a	+¼	.. ..
665,000	,,	Mar. 22	8	7	British Ord.	114—117	+1	116 117
100,000	,,	June 28	7	7	Do. 7 p.c. Pref.	111—114	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	73—76	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	94—97	..	..
160,000	10	May 24	6	8	Cape Town, Ltd.	7½—8¼	..	..
160,000	10	Apl 26	4½	4½	Do. 4½ p.c. Pref.	6¼—7½	..	7⅛—7 1/16
160,000	Stk.	June 28	4½	4½	Do. 4½ p.c. Deb.	70—75	..	..
626,860	,,	July 26	6	6	Cardiff Con. Ord.	96—99	..	..
287,840	,,	June 28	7½	7½	Do. 7½ p.c. Red. Deb.	100—103	..	..
167,150	,,	Aug 16	6⅔	5	Chester 5 p.c. Ord.	88—93d*	..	..
79,185	1	Apl. 26	1/-	1/-	Colombo Ltd. Ord.	33/—34/-	..	..
24,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	20/—22/-	..	..
375,402	1	Apl. 12	1/9½	1/9½	Colonial Gas Assn. Ld. Ord.	23/—25/-	..	..
157,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	21/—23/-	..	..
2,073,280	Stk.	July 26	7	5	Commercial Ord.	97—100	..	99—99½
475,000	,,	June 14	8	8	Do 8 p.c. Deb.	57—60	..	..
800,000	,,	Sept. 29	11	11	Continental Union, Ltd.	33—36	..	34
100,000	,,	Mar 8	7	7	Do. 7 p.c. Pref.	92—97	..	..
187,560	,,	Aug. 16	7	7	Croydon sliding scale	107—110*	..	..
403,100	,,	,,	5	5	Do. max. div.	82—85*	..	..
492,870	,,	Aug 16	10	7	Derby Con.	115—120e*	..	..
55,000	,,	June 28	4	4	Do. Deb.	71—73e	..	..
909,000	,,	Mar 8	5	5	East Hull Ord. 5 p.c.	76—79	..	..
60,000	,,	June 28	5	5	Eastbourne 5 p.c. Deb.	91—96	..	..
1,002,180	10	Mar. 22	14	16	European, Ltd.	8 9	..	8⅝
13,705,480	Stk.	July 26	5/1/4	5⅛	Gas Light & Coke 4 p.c. Ord.	18/9—19/3/	..	18/10½—19 1⅛
2,900,000	,,	,,	8⅛	8⅛	Do. 8½ p.c. max.	61⅛—63¼	..	62a—62⅝
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	77—80	..	78⅝—79½
5,602,930	,,	June 14	8	8	Do. 8 p.c. Con. Deb.	61—62	..	60—60⅝
181,315	,,	,,	6	6	Do. 6 p.c. Br'tf'd Rd. Db.	103 106	..	..
1,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	99—101	..	100⅛
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	.. ..	..	..
93,600	,,	Mar. 8	6⅔	6⅔	Hastings & St L. 5 p.c. Conv	90—95	..	92½
988,740	,,	,,	5⅔	5⅔	Do. 8½ p.c. Conv.	72—76	+1½	..
10,000	10	Apl. 26	10	10	Hongkong & China, Ltd.	18½—14½	..	..
173,200	Stk.	Mar. 8	5	5	Hornsey Con. 3½ p.c.	83—85	..	..
1,976,000	,,	May 24	10	10	Imperial Continental Cap.	170—175	..	173—174
223,130	,,	Aug. 16	8½	8½	Do. 8½ p.c. Red. Deb.	67—69*	..	68—60
235,242	,,	Aug 16	7	7½	Lea Bridge 5 p.c. Ord.	94—97*	..	..
2,145,907	,,	Aug. 16	5½	5½	Liverpool 5 p.c. Ord.	90—90½b	—⅛	..
600,000	,,	Mar 22	7	7	Do. 7 p.c. Red. Pref.	103¼—105¼b	..	..
165,736	,,	Aug. 16	8	9	Maidstone 5 p.c. Cap.	113—117*	..	..
63,480	,,	June 14	3	3	Do. 3 p.c. Deb.	53—56	..	..
75,000	5	June 14	18	18	Malta & Mediterranean	5½—6½	..	..
541,920	Stk.	May 24	15	17	Montevideo, Ltd.	94½—96½	..	..
2,061,315	,,	Aug. 16	5	5	Newcastle & Gateshead Con.	16/—16/6d*	+-/1½	..
360,929	,,	,,	4	4	Do. 4 p.c. Pref.	73—74d*	..	..
491,705	,,	June 28	8½	8½	Do. 8½ p.c. Deb.	66—67d	+½	..
131,780	,,	Mar. 8	6/18/0	6/18/0	North Middlesex 6 p.c. Con.	98—101	..	..
200,000	,,	Apl. 26	9	7	Oriental, Ltd.	115—118	..	116½
188,190	,,	June 28	7½	7½	Plym'th & Ston'house 5 p.c.	107—112	..	..
414,500	,,	Feb. 23	7½	7½	Portsm'th Con. Stk. 4 p.c. Std.	101—104	..	..
236,782	,,	,,	5	5	Do. 5 p.c. max.	77—80	..	..
2,334,464	1	—	—	—	Primitiva Ord.	23/6—24/6	..	23/7½—24/1½
944,690	100	June 1	4	4	Do. 4 p.c. Red. Deb.	91—94	..	..
695,000	Stk.	July 26	4	4	Do. 4 p.c. Red. Deb. 1911	76—78	..	..
416,345	,,	June 28	4	4	Do. 4 p.c. Cons. Deb.	75—77	..	..
160,000	10	Mar. 22	6	6	San Paulo 8 p.c. Pref.	8⅞—8⅞	..	8⅝
370,000	Stk	Mar. 22	6	6	Sheffield A	104—106e	+1	..
419,988	,,	,,	6	6	Do. B	104—106e	+1	..
1,047,000	,,	,,	6	6	Do. C	104—106e	+1	..
90,000	10	June 14	13	14	South African	4—6	..	..
6,603,895	Stk.	July 26	7½	5	South Met. Ord.	105 107	..	105½—106½
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	108—111	..	..
1,995,445	,,	July 12	8	8	Do. 8 p.c. Deb.	58—61	..	59¼—60¼
734,000	,,	Mar. 8	6½	6½	Do. 6½ p.c. Red. Db.	100—102	..	101½—101¾
91,500	,,	Aug. 16	8½	8½	South Shields Con.	107—109d*	—3	..
1,345,798	,,	July 26	6½	6½	South Suburban Ord. 5 p.c.	105—108	..	108
868,827	,,	June 28	5	5	Do. 5 p.c. Deb.	96—99	..	100½
947,740	,,	Mar. 22	6	6	South'mpton Ord. 6 p.c. max.	78—80	..	..
121,375	,,	June 28	4	4	Do. 4 p.c. Deb.	72—75	..	..
350,000	,,	Mar. 8	7	7	Swansea 7 p.c. Red. Pref.	100—103	..	..
300,000	,,	June 28	6½	6½	Do. 6½ p.c. Red. Deb.	99—102	..	..
120,000	,,	July 26	7⅞	8	Tottenham District A 5 p.c.	116—121	..	..
982,276	,,	,,	6½	6½	Do. B 6½ p.c.	95—98	..	..
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	96—99	..	..
191,455	,,	June 14	4	4	Do. 4 p.c. Deb.	76—79	..	79
289,094	,,	Mar. 8	6½	6 5/8	Uxbridge, Maidenhead, & Wycombe 5 p.c.	90—95	..	..
98,530	,,	,,	5	5	Do. 5 p.c. pref.	86—90	..	..
80,000	,,	July 12	8½	8½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	126—129	..	..
365,636	,,	,,	7	7½	Do. B 8½ p.c.	108—113	..	..
492,525	,,	,,	6/19/0	6½	Do. C and New	96—101	..	100½—100½
852,000	,,	,,	6⅞	6½	Do. Wimbledon 5 p.c.	104—109	..	..
98,000	,,	,,	7½	7⅝	Do. Epsom 5 p.c.	110 —115	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref	88—91	..	..
88,516	,,	June 28	8	8	Do. 8 p.c. Deb.	56—59	..	..
284,743	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle. e.—Sheffield. f.—The quotation is per £1 of Stock * Ex div † Paid free of income-tax. ‡ For year.

Hastings 3½ p.ct. improved 1½ points to 72-76, and British ordinary and the Sheffield three stocks were also marked up 1 point. Liverpool 5 p.ct. ordinary dropped ⅛ at the local exchange. This stock is very attractive at the average price of 90¼, realizing at the last rate of dividend nearly £6 2s. p.ct.

The following transactions were recorded during the week:

On Monday, Bournemouth "B" 12 7/16, Bristol 5 p.ct. 90, British 116, Cape Town 4½ p.ct. preference 6⅞, Gas Light and Coke 18s. 10½d., 18s. 11¼d., 3½ p.ct. 62½, 4 p.ct. preference 78¾, 79, 3 p.ct. debenture 60½, 5 p.ct. debenture 100¾, Hastings and St. Leonards 5 p.ct. 92½, Imperial Continental 172, Primitiva 24s. 1½d., San Paulo 6 p.ct. preference 8⅞, South Metropolitan 105½, 3 p.ct. debenture 59½, Tottenham 4 p.ct. debenture 79. Supplementary prices, Bournemouth 7 p.ct. debenture 103½, Brighton and Hove 4 p.ct. "C" preference 70½, Gas Light and Coke 5 p.ct. debenture 1952-57 100⅞.

On Tuesday, Alliance and Dublin 95½, Bombay 23s., Bournemouth "B" 12 5/16, Bristol 90, British 116, 117, Gas Light and Coke 18s. 10½d., 18s. 11¼d., 19s., 19s. 0⅜d., 19s. 1½d., 4 p.ct. preference 78¾, 5 p.ct. debenture 100¾, Imperial Continental 173, 174, Primitiva 24s. 1½d., South Metropolitan 105⅞, 106½, South Suburban 5 p.ct. 108, 5 p.ct. debenture 100½, Wandsworth "C" 100¼, 100½. Supplementary prices, British 4 p.ct. debentures 77⅞, Gas Light and Coke 5 p.ct. debenture 100⅞.

On Wednesday, Alliance and Dublin 95⅞, Bournemouth "B" 12⅝, British 116, Cape Town 4½ p.ct. preference 7 1/16, Commercial 99, Continental Union 34, Gas Light and Coke 18s. 10½d., 18s. 11¼d., 19s., 19s. 0⅜d., 3 p.ct. debenture 60, Newcastle 3½ p.ct. 16s. 4½d., 16s. 9d., Primitiva 24s., 24s. 1½d., South Metropolitan 106, 3 p.ct. debenture 60½, 6½ p.ct. debenture 101½. Supplementary prices, Gas Light and Coke 5 p.ct. debenture 100¾, 100⅞, Hartlepool 5 p.ct. 82⅞, Leatherhead 5 p.ct. 10½.

On Thursday, Alliance and Dublin 95⅞, 95⅞, Bombay 23s., European 8⅜, Gas Light and Coke 18s. 10½d., 18s. 11¼d., 19s., 19s. 0⅜d., 19s. 1½d., 3 p.ct. debenture 60, Imperial Continental 172, 173, 173¼, 3½ p.ct. debenture 68, Oriental 116½, Primitiva 23s. 10½d., South Metropolitan 105⅝, 6½ p.ct. debenture 101¼. Supplementary prices, Gas Light and Coke 5 p.ct. debenture 100⅞, Metropolitan 5½ p.ct. debentures (issued at £100, £50 paid) 50.

On Friday, Alliance and Dublin 95½, Commercial 99½, Gas Light and Coke 18s. 10½d., 19s., 19s. 1½d., 3½ p.ct. 62½, 62⅝, 4 p.ct. preference 79½, Imperial Continental 173½, 174, 3½ p.ct. debenture 69, Primitiva 23s. 7½d., 24s., 24s. 1½d., South Metropolitan 105⅞, 106½. Supplementary prices, Brentwood 5½ p.ct. debenture 102, Gas Light and Coke 5 p.ct. debenture 100⅞, Metropolitan (Melbourne) 5½ p.ct. debentures (issued at £100, £50 paid) 50, Newport (Mon.) 5 p.ct. debenture 85½.

Loanable credit was as usual at the week-end abundant in Lombard Street. After 3½ p.ct. had been offered, the rate for new and old money gradually declined to 2⅜ p.ct. There was a further slight rise, about 2½d. p.ct. in the average rate at which Treasury Bills were allotted, £4 5s. 7·80d. p.ct., which exerted a strengthening influence on the discount market.

The dollar-sterling exchange moved slightly in favour of sterling, closing at 4.85 11/32; the French exchange fluctuated between large limits, and finished slightly lower at 124.25. Pesetas were a quiet market, and finally showed a decline at 29.16. Lira were firm, and the Milan rate closed at 92.65⅜. There was no change in Belgas or Dutch florins at 34.89⅜ and 12.10⅜ respectively.

Silver was affected by Indian and Chinese sales, and the price was fixed at 27d. per oz. Gold remained at the nominal price of 84s. 11½d. per oz.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21, 1927. The Banks' deposit rate is 2½ p.ct., and the deposit rates of the discount houses are 2½ p.ct. at call and 2⅝ p.ct. at notice

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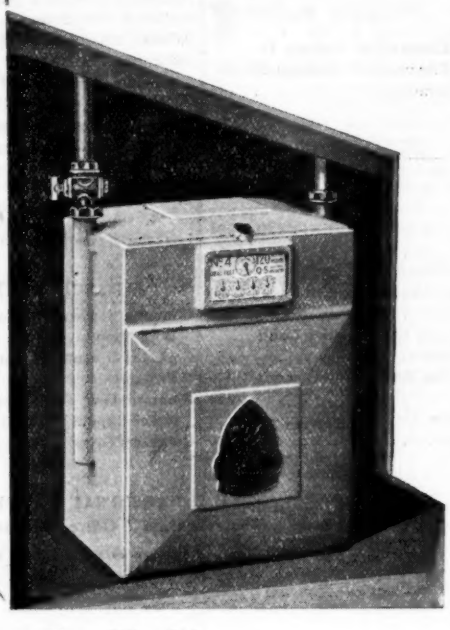

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